User Manual

INAT echolink

Serial to Ethernet Converter

Manual Version 0205-002e

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IMPORTANT NOTES

It is not permitted to run this remote access device and their programs without visual communication or control. Therefore the operation of this remote maintenance unit is only allowed, if a supervisory person, who can always intervene in the installation or run time, is present.

If you want to use your own connector power pack, mind the pole allocation of the 24V plug.

Read the manual before the start. For damages due to improper connection, implementation or operation INAT refuses any liability according to our existing guarantee obligations.

The recent version of this manual is available in the Download Area of the INAT at:
www.inat.de

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1 General

1.1 Deliverables

Before getting started with INAT echolink, check the following list of components that should be contained in the echolink package.

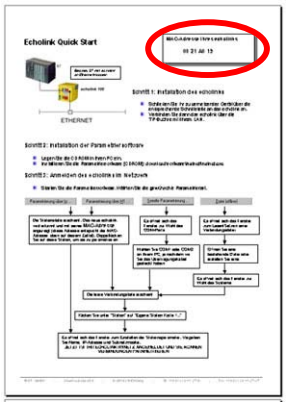
Scope of Supply	
echolink device with adapter for top hat rail or adapter for DIN rail (S7-300)	
echolink "Quick Start" with **MAC Address** of the echolink	
CDROM with ➢ Parameter setting software ➢ INAT demo software ➢ INAT manuals	

Figure 1-1: Scope of Supply of echolink

Note

A connector power pack for the power supply is not included. Please order it separately:
700-5596-01 (Model EURO)
700-5596-02 (Model UK)
700-5596-03 (Model USA)

If you want to use your own connector power pack please insure the polarity of the 24V DC power supply (positive pole at the top, negative pole at the bottom).

1.2 Features

INAT echolink is a Serial Ethernet converter. With echolink, devices without network adapter are able to communicate via network.

Echolink supports a wide range of serial protocols. On Ethernet side the transport protocols TCP and ISO (H1) are supported. Moreover the higher-level-protocols ISO on TCP, Modbus on TCP, EtherNet/IP, S7 and S5 are implemented. Therefore echolink is much more than a simple data converter. It supports complex applications such as PLC programming or process data visualisation. With the function echoactive, devices that are normally passive (in consequence of the application protocol) become active. Send / Receive communications is possible.

- ***One device for up to 5 serial devices***
- ***Remote maintenance***
- ***PLC programming via Ethernet***
- ***Visualisation***
- ***IT functions: FTP, Telnet Server***
- ***Gateway between different controller worlds: Siemens / Schneider / Rockwell***

Echolink is designed to fulfil the special demands of industry at the best. For that purpose an adapter for top hat rail is included in the deliverables. An adapter for DIN rail (S7-300) is available on demand.

1.3 Technical Specifications

echolink	
LAN	
Ethernet:	1 x 10 base T / 100 base TX, RJ45
Data transmission:	10 Mbps and 100 Mbps
Application Protocols:	• S7 Protocol • S5-AP • Modbus on TCP • EtherNet/IP • Send / Receive (Raw data / Socket)
Transport Protocols:	• TCP/IP • TCP/IP with ISO on TCP (RFC1006) • TCP/IP with PLC Header • ISO (H1)
SERIAL	
Serial Interfaces:	Basic device without interfaces, upgradeable to 5 interfaces MPI, RS232, TTY, RS422, RS485.
Serial Protocols:	• AS511 (S5 PG) • 3964(R), RK512 • Modbus RTU • MPI, PPI • Telnet • AEG Ks optional: • ABC (IPC620)
Supply voltage:	18....36V DC; ≈ 1,1A
Power supply:	external
Current consumption:	0,3 A
Dimensions [in mm]:	L = 110, D = 120, H = 120
Assembly:	Top hat rail adapter

Table 1-1: Technical Specifications echolink

1.4 Hardware

1.4.1 Front panel of the echolink

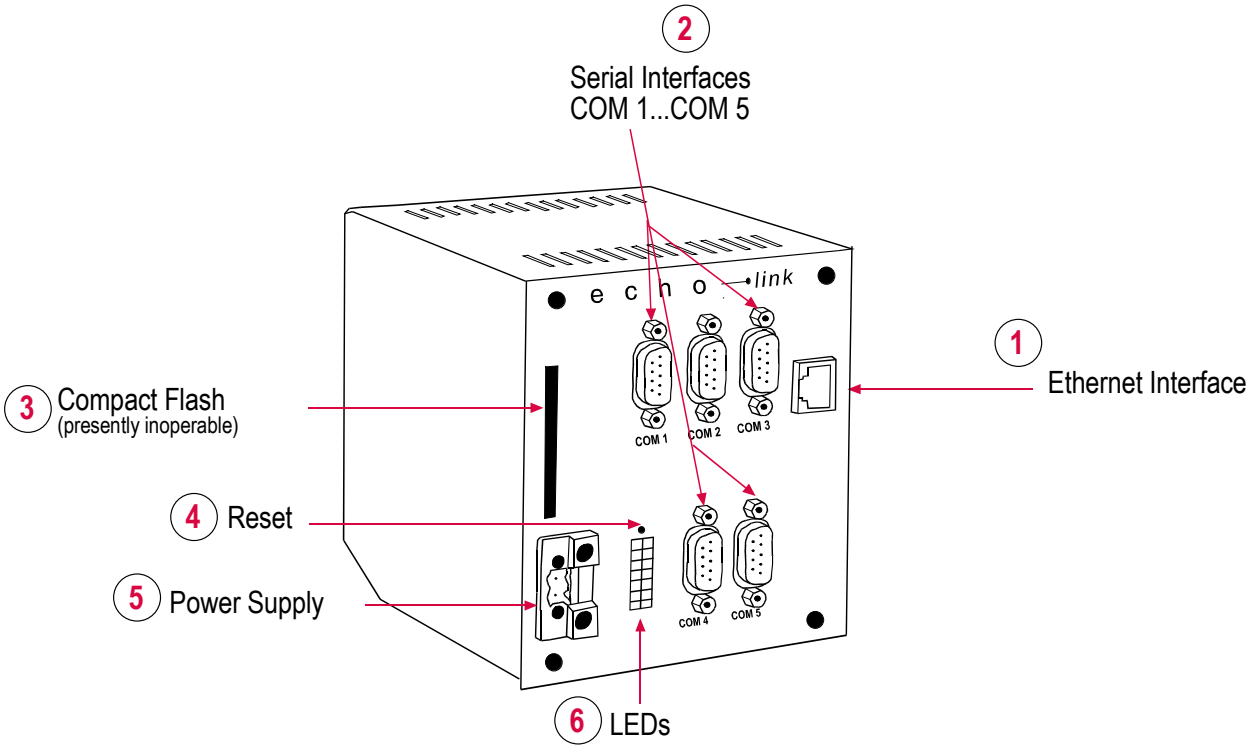


Figure 1-2: Front panel of echolink

1.4.2 TP interface

Echolink is equipped with one TP interface (RJ45) for connection to the Ethernet network. See the following figure for the wiring of the TP socket.

Ethernet Interface RJ45		
Pin No.:	**Signal:**	**Function:**
1	TD+	Send data +
2	TD-	Send data -
3	RD+	Receive data +
4	----	Not used
5	----	Not used
6	RD-	Receive data -
7	----	Not used
8	----	Not used

Table 1-2: Connector assignment of the Ethernet interface (RJ45)

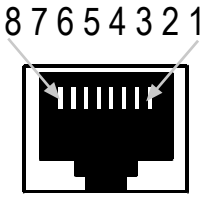


Figure 1-3:TP socket

1.4.3 Serial Interfaces

The serial interfaces are required to connect the serial device (e.g. Simatic S7 PLC with MPI interface) with echolink.

The basic device is NOT equipped!

Echolink can be equipped with up to 5 serial interfaces. The following interfaces are available:

- ***MPI***
- ***Dual MPI***
- ***RS232***
- ***TTY (20mA)***
- ***RS422, floating***
- ***RS422, non-floating***
- ***RS485, floating***
- ***RS485, non-floating***

The interfaces are arbitrary with the following restrictions:

- Two MPI interfaces are maximum allowable per echolink
- MPI interface at COM port 1 is not allowed
- Four RS485 interfaces are maximum allowable per echolink
- Ex one TTY interface, two RS232 interfaces are maximum allowable
- Ex one RS485 interface, two RS232 interfaces are maximum allowable
- A combination of RS422 interfaces and RS485 interfaces is not allowed

1.4.3.1 MPI Interface

See the following table for the Pin allocation of the MPI interface.

MPI Interface	
Pin No.:	**Signal:**
1	Not used
2	Not used
3	Data B
4	RTS AS
5	Ground (5V)
6	+5 V
7	Not used
8	Data A
9	RTS PG

Table 1-3: Connector assignment of the MPI interface

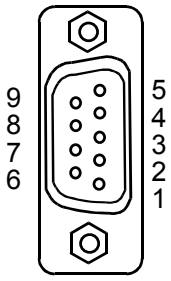


Figure 1-4:MPI socket

1.4.3.2 TTY Interface (20 mA, Current Loop)

See the following table for the Pin allocation of the TTY interface.

TTY Interface	
Pin No.:	**Signal:**
1	20 mA_1
2	20 mA_2
3	TxD
4	RxD
5	Gnd
6	-RxD
7	Gnd
8	Gnd
9	-TxD

Table 1-4: Connector assignment of the TTY interface

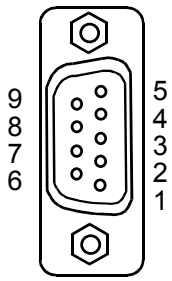


Figure 1-5:TTY socket

1.4.3.3 RS232 Interface

See the following table for the Pin allocation of the RS232 interface.

RS232 Interface	
Pin No.:	**Signal:**
1	DCD
2	RX
3	TX
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

Table 1-5: Connector assignment of the RS232 interface

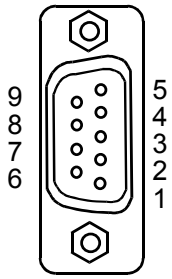


Figure 1-6:RS232 socket

1.4.3.4 RS422 Interface

See the following table for the Pin allocation of the RS422 interface.

RS422 Interface	
Pin No.:	**Signal:**
1	not used
2	not used
3	TX+
4	RX+
5	GND
6	RX-
7	Term+
8	Term-
9	TX-

Table 1-6: Connector assignment of the RS422 interface

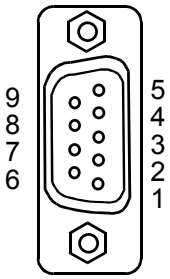


Figure 1-7:RS422 socket

1.4.3.5 RS485 Interface

See the following table for the Pin allocation of the RS485 interface.

RS485 Interface	
Pin No.:	**Signal:**
1	not used
2	not used
3	Data+
4	not used
5	GND
6	not used
7	Term+
8	Term-
9	Data-

Table 1-7: Connector assignment of the RS485 interface

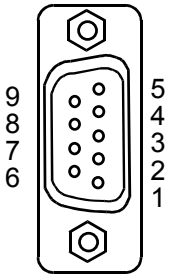


Figure 1-8:RS485 socket

1.4.4 Compact Flash

The Compact Flash is presently inoperable. Please do not try to insert a Compact Flash Card. The device could be damaged.

1.4.5 Reset

Reset triggers a restart of the echolink CPU. The station parameters remain unchanged.

Note

In order to avoid a mistake, the switch is recessed and can only be accessed with a thin ball point pen or with a nail.

1.4.6 Power Supply

A connector power pack for the power supply is not included. Please order it separately:

- 700-5596-01 (Model EURO)
- 700-5596-02 (Model UK)
- 700-5596-03 (Model USA)

If you want to use your own connector power pack please insure the polarity of the 24V DC power supply (positive pole at the top, negative pole at the bottom).

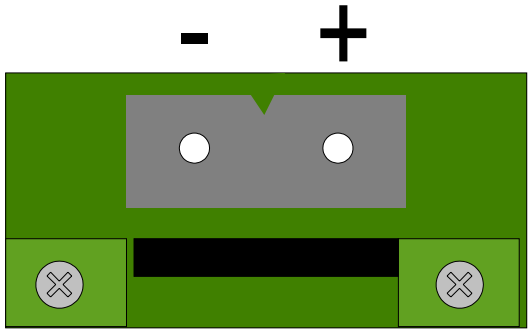


Figure 1-9:Power supply

1.4.7 LEDs

The LEDs on the front panel of the echolink have the following meaning:

LEDs	
LED:	***Meaning:***
Net Conn	One of the parameterized connections is established
Net Send	Echolink sends user data onto Ethernet
Net Rec	Echolink receives user data from Ethernet
Tx Net 1	Echolink sends data onto Ethernet
Rx Net 1	Echolink receives data from Ethernet
Param	Indicates, that the parameter setting software is accessing the echolink via TCP or H1
Power	Echolink is correctly connected to the power supply
Com 1- Com 5	User data run on the serial port
Error	Protocol error or logic error on the serial side

Table 1-8: LEDs

2 Function of the echolink

Echolink is a Serial to Ethernet Converter that enables devices without network interface, to communicate in the world of Ethernet using their own basic serial interface. Serial industrial devices become network-compatible and are ready to communicate with other Ethernet devices.

- The serial device is connected with echolink via a serial connection cable.
- Echolink is connected to the Ethernet via its Ethernet interface (RJ45).

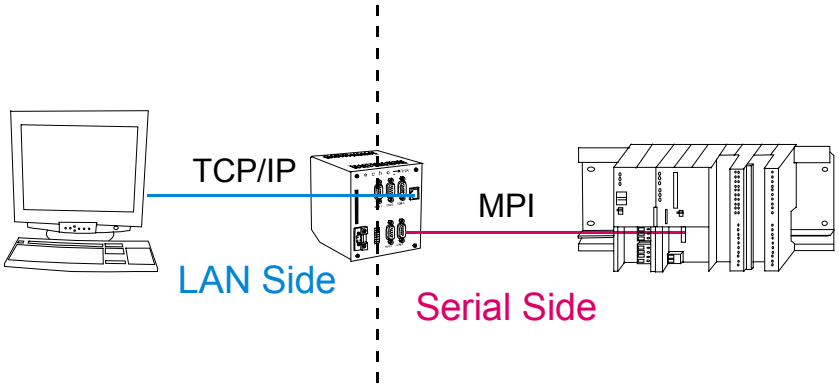


Figure 2-1: LAN side and serial side of the echolink connection

- Echolink is now the intermediary between the communication partners (in the figure above the PC and the S7 PLC).
- When data is transferred, echolink is always sender and receiver.
- On the one side, echolink receives data (either from an Ethernet device or from the device that is connected with echolink). On the other side, the received data is redirected (either to the device that is connected with echolink or to the Ethernet device).
- The real mission of echolink is Protocol Conversion, receiving data in one protocol on one side and sending that data, in another protocol, to the final destination on the other side.
- To complete this task echolink requires some information: What station and application running on what station will receive the data? What transport protocol and application protocol are used in the LAN and what protocol is used on the serial side? Other parameters like baud rate, parity bit on the serial side as well as header, life acks etc. have to be adjusted.
- Echolink receives this information during connection parameterization
- A parameterized connection in echolink always consists of two sides: a network (LAN) side and a serial side.

2.1 Serial Side

On the serial side, echolink is either directly connected with the serial device (point-to-point connection) or echolink is – together with the serial device – member of a serial bus. The serial bus is either a MPI subnet or a Modbus RTU net.

The following parameters are defined on the serial side:

Serial Side
▪ Serial protocol (e.g. AS511, MPI)
▪ Type of job
▪ Parameters for serial line (e.g. baud rate, stop bits etc.)
▪ Special parameters for certain procedures (e.g. coordinate flags with RK512)
▪ Addresses with bus protocols (e.g. MPI address, Slave address)

Table 2-1: Parameters serial side

2.2 Network Side

Via the Ethernet interface, echolink is connected to the Ethernet. It can communicate with other Ethernet devices.

The following parameters are defined on the network side:

Network Side
▪ Transport protocol (TCP/IP or H1) and application protocol (e.g. S5, S7, Modbus on TCP)
▪ Addresses (e.g. IP address, port, TSAP)
▪ Network parameters (e.g. header, priority etc.)
▪ Connection establishment (active, passive)

Table 2-2: Parameters network side

3 Getting Started

The following steps have to be executed to work with the echolink:

Getting Started		
Step 1:	Echolink Mounting	chapter 3.1 → page 20
Step 2:	Connecting Power	chapter 3.2 → page 23
Step 3:	Connecting to Ethernet	chapter 3.3 → page 24
Step 4:	Connecting serial device with echolink	
Step 5:	Installation of the parameter setting software	chapter 3.4 → page 24
Step 6:	Connecting PC and echolink	chapter 3.5 → page 26
Step 7:	Initial Configuration	chapter 3.6 → page 27

Table 3-1: Required steps

3.1 Echolink Mounting

There are two possibilities for echolink mounting:

- Top hat rail mounting
- S7-300 rail mounting

Guidelines for mounting echolink

- Mount the echolink only when it is switched off
- Horizontal mounting
- Keep echolink away from heat and electric interferences
- The cooling slots of the echolink must not be covered
- Keep enough space for ventilation

3.1.1 Top hat rail mounting

If echolink is equipped with an adapter for top hat rail additional accessories are not required for mounting. Just follow these steps:

1. Attach the echolink on the rail
2. Rotate the echolink down to the DIN rail and snap the clip closed. Carefully check that the clip has fastened the echolink securely onto the rail.

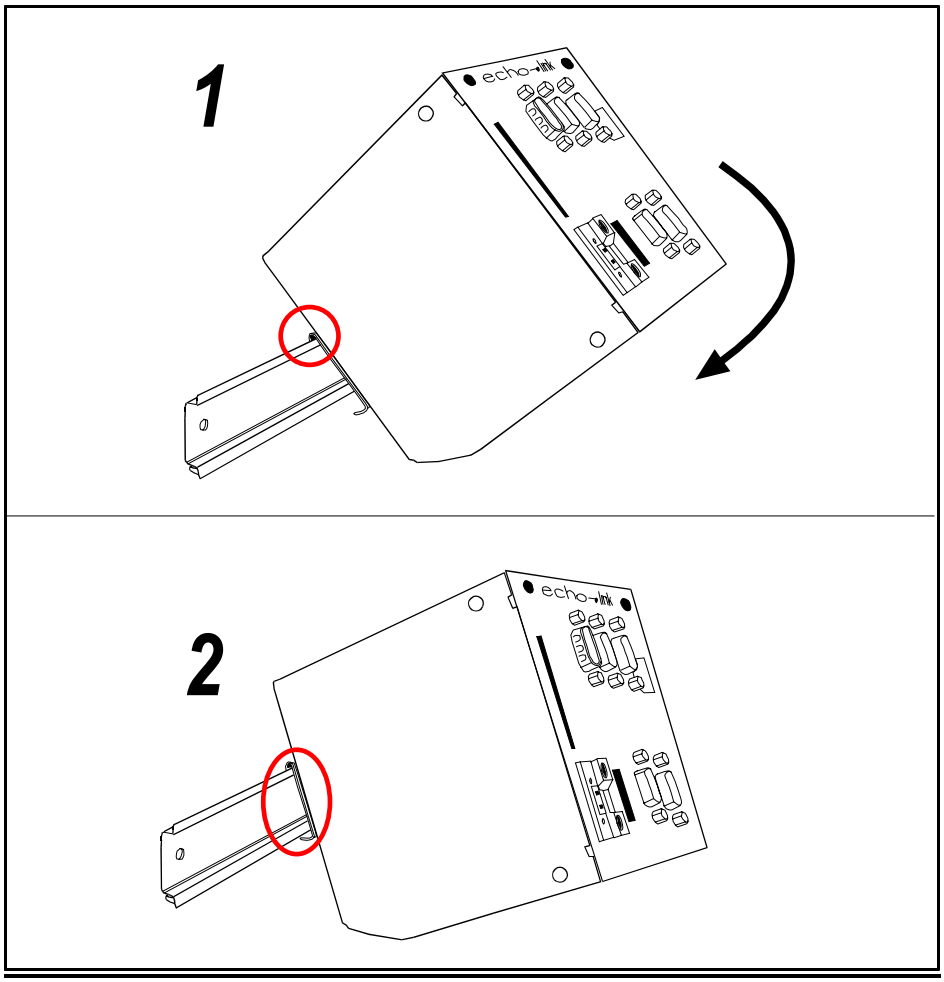


Figure 3-1: Echolink mounting

3.1.2 S7-300 rail mounting

If echolink is equipped with an adapter for S7-300 rail mounting, the screws required for mounting are part of the deliverables. Follow these steps:

1. Attach the echolink on the rail
2. Rotate the echolink down to the rail
3. Screw tightly the echolink

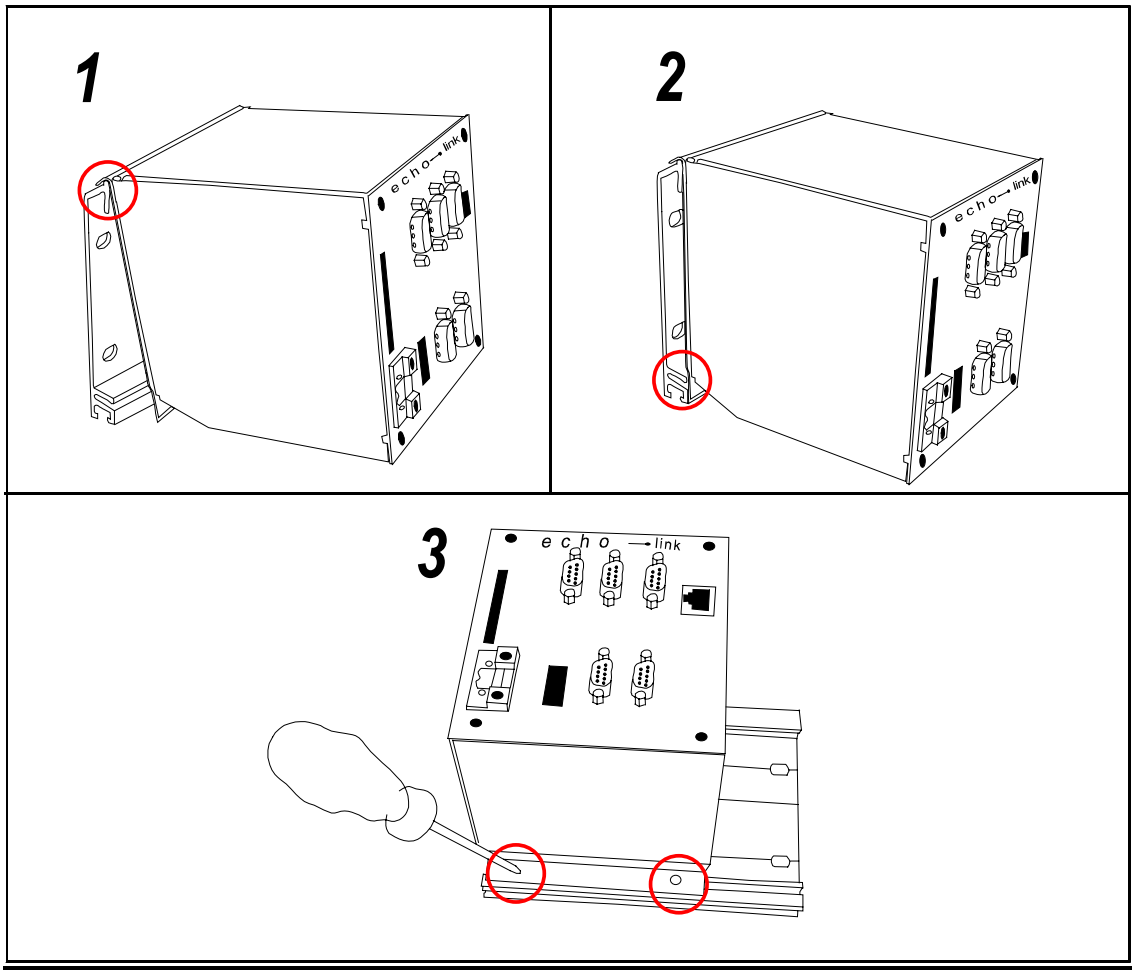


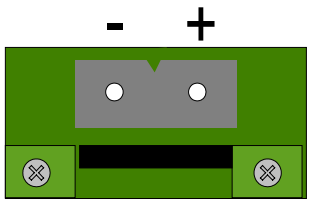
Figure 3-2: S7-300 rail mounting

3.2 Connecting Power

A connector power pack for the power supply is not included. Please order it separately with the following order numbers:

- 700-5596-01 (Model EURO)
- 700-5596-02 (Model UK)
- 700-5596-03 (Model USA)

If you want to use your own connector power pack please insure the correct polarity of the 24V DC power supply



Connect the power supply with the echolink and plug the adapter to the power socket.

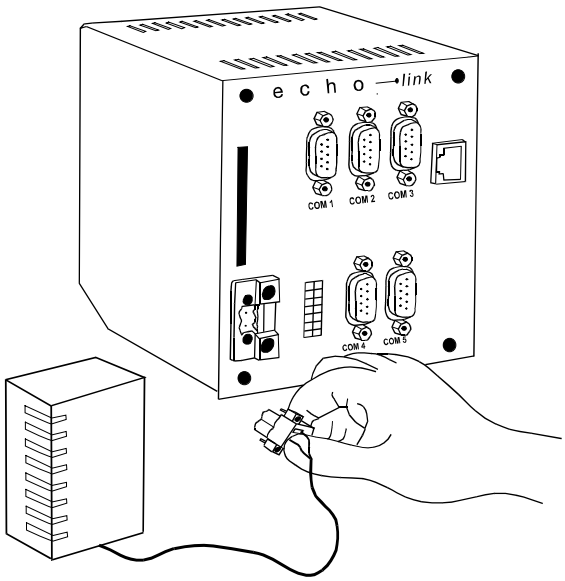


Figure 3-1: Connecting power supply

Note

Echolink will start immediately when power is applied. There is no On/Off switch on the module. Wait until there is only the green Power LED shining. The device indicates that it is ready for operation.

3.3 Connecting to Ethernet

- The Ethernet connection uses a standard RJ45 connector.
- The one end of a TP cable is plugged into the TP socket (RJ45) on the front panel of the echolink. The other end is plugged into an Ethernet Hub/Switch that is connected to your network.
- The LED TX Net 1 and / or TX NET 2 should blink now. If this LED is not blinking, the connection to the network and the network cable need to be checked.

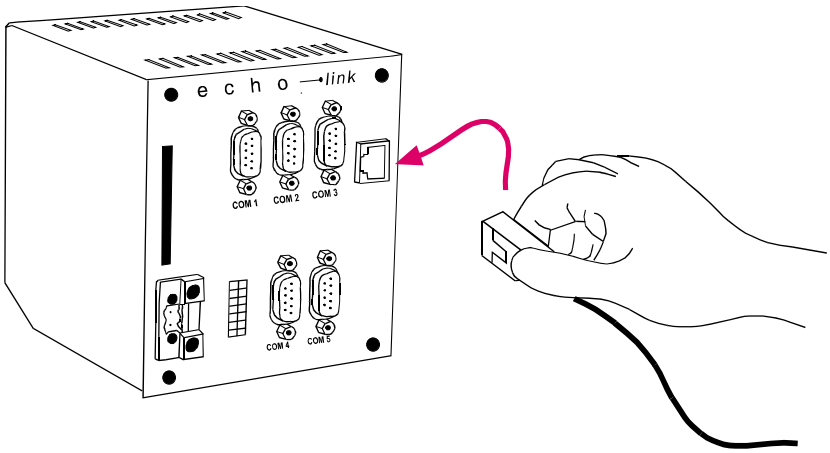


Figure 3-2: Connecting to Ethernet

3.4 Installation of the parameter setting software

With the INAT.net parameter setting software you can register echolink in the network and set up the parameters for your connections. The parameters edited here are loaded directly to the echolink or are saved locally for later transmission to the echolink. With the parameter setting software you can monitor connections and make diagnostic checks.

The parameter setting software has to be installed on a PC. PC and echolink have to be connected directly or indirectly (see chapter 3.5). For installing the software follow these steps:

1. Insert the CDROM “echolink“. If auto-start is not activated in your PC, use start.exe or index.html. If auto-start is activated, the following dialog appears:

Figure 3-3: Start dialog window

2. “Installation“: a list of the files to install INAT.net parameter setting software.
”Overview“: a downloadable overview with INAT software and manuals.
Select “Installation“. The following window appears:

Figure 3-4: CDROM “INAT echolink“

3. Click inatnet.exe.

4. You will be guided through the installation.

5. When the parameter setting software is installed, the basic configuration can be performed

3.5 Connecting PC and echolink

A connection between PC and echolink is required for:

Connection PC ←→ echolink
Online Parameter setting capability
Serial Parameter setting capability
Transfer of a parameter file from PC to echolink and vice versa
Diagnostic and test functions
Programming S5 / S7 via Ethernet

The connection between PC and echolink can be established directly via the serial interface (null modem cable) or indirectly via bus.

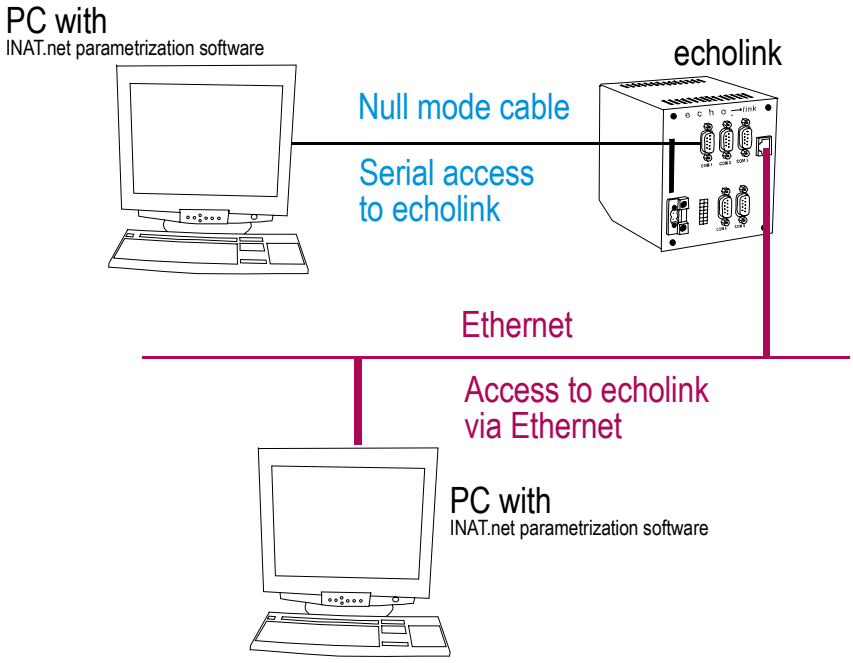


Figure 3-5: Connecting PC with echolink

In this example echolink is directly connected with the upper of the two PCs via serial interface RS232 and a null modem cable. The lower of the two PCs is accessing echolink via TCP/IP or H1 network.

3.6 Basic configuration of the echolink

- When registering echolink in the network, the device receives all the parameters required to be identified as a network node e.g. name, IP address, subnet mask etc.
- Start the parameter setting software. The start dialogue window appears:

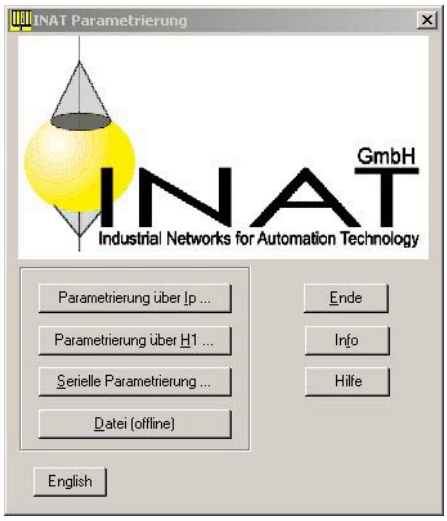


Figure 3-6: Start dialogue window

- Four methods of setting the parameters are provided here:

Parameter Setting Method:	Function
Set Parameters via IP / H1	For setting parameters via IP / H1 the echolink has to be connected indirectly with the PC via the Ethernet network. This method of setting parameters permits you to set parameters for modules from any point of a TCP/IP or H1 network.
Set Parameters using a serial connection	To set parameters using a serial connection the PC and echolink have to be connected directly via null modem cable. When the serial connection is used, the cable length is usually limited to a few meters (i.e., the module must have its parameters set on site).
File (offline)	With Offline the parameter files are stored locally in a file on the PC for later transmission to the echolink.

3.6.1 Setting Parameters via IP or H1

Note

When registering echolink in the network (via IP or H1) the device has to be connected to the same LAN as the PC running the parameter setting software. Stations behind routers are not detected!

- Select “Parameterization via IP“ or “Parameterization via H1“. The station list appears. All stations which are currently available online on the network are indicated. The new echolink is indicated with its MAC address.

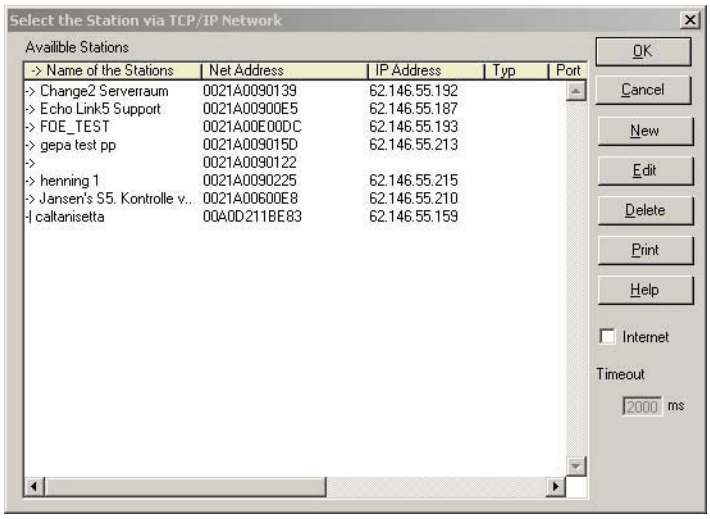


Figure 3-7: Station list while basic configuration of the echolink in the network

- All stations marked with an arrow at the beginning of the line are stations which are online and available on the network. The other stations may be available but are not automatically recognized.

Station has not been detected?

If a station has not been detected in the automatic online display, possible causes are:

- ➢ The selected station is turned off
- ➢ The protocol (i.e., H1 or TCP/IP) used for the connection is not installed correctly on your operator-control computer
- ➢ Echolink is situated behind a router

- Mark the echolink station and click the button „OK“.
- The window to enter the station parameters appears.

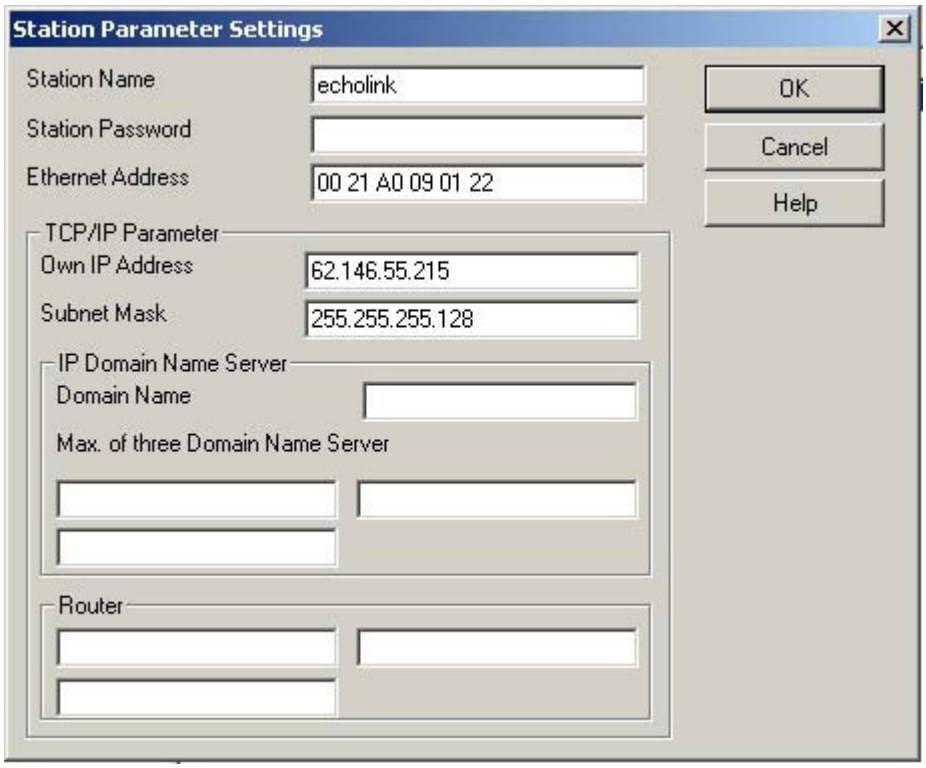


Figure 3-8: Echolink basic configuration: Station Parameter Settings

- The following entries can be made:

STATION PARAMETER SETTINGS
Station name
Each station can be assigned a name. This name is used to identify the station. Remember that each station name within a network must be unambiguous.
Station password
If a password is set, this password is required whenever you try to edit the parameters. This applies only with online parameterization.
Ethernet Address
Each station in an Ethernet network has an unambiguous station address. This address is stored on the network interface card and is used to identify the station in the network. The addresses within a network must be unambiguous (i.e. no two addresses may be the same).
Use DHCP
If there is a DHCP Server configured in your LAN that can provide IP addresses from a pool of IP addresses, activate the button DHCP
IP Address
The IP address defines the logical network address in TCP/IP networks. This address is indicated as a “sender“ address as well as “receiver address“ in data packets that are transferred with the IP protocol. IP addresses has to be unambiguous
Subnet mask
Enter the Subnet mask of the echolink here. The IP Subnet Mask determines which station requests may pass to the active network. Addresses, which are different in their masked part, are sent to the routers.
IP Domain Name Server   ***Domain Name***
The domain name can be used to address a maximum of three Domain Name Servers in the network.
Maximum of three Domain Name Server
The IP domain name server converts the symbolic Internet names into station addresses. The address of your domain name server is available from your system administrator. Up to three domain names can be used.
Router
A router is used when an address cannot be located on the local network. Enter the IP addresses of the routers in the LAN

Table 3-2: Station Parameter Settings

Note

The entries for Domain Name Server, Domain, Gateway et al. can be obtained from your system administrator

- Confirm your entries with “OK“. The station window appears again. The station is now indicated with name, MAC address and IP address (if entries have been made).

3.6.2 Serial Parameterization

- Select “Serial Parameterization“.

Figure 3-9: Selecting COM port for serial parameterization

- Select the COM port of your PC where the null mode cable will be plugged in for connection with the echolink. If the connection is established the empty connection list appears. If the connection can not be established, a warning notice appears

Possible causes:

- The connection cable may not be plugged in
- The connection cable is allocated incorrectly
- The interface card on your PC is defective
- The interface on your PC is being used for another task

- Select ***Station > Current Station Adapter 1...***
- The window “Station parameter Settings“ appears
- See table Station parameter settings on page 30 to learn which entries can be made here.
- Confirm your entries with “OK“.
- The registration is complete. Connections can be parameterized now.

3.6.3 Offline

- Start the parameter setting software and select “File” (Offline).
- The window “Reading the connection file“, will appear. Here you may open an existing parameter file or create a new one.
- To create a new parameter file enter a new name and click the button “Open“.

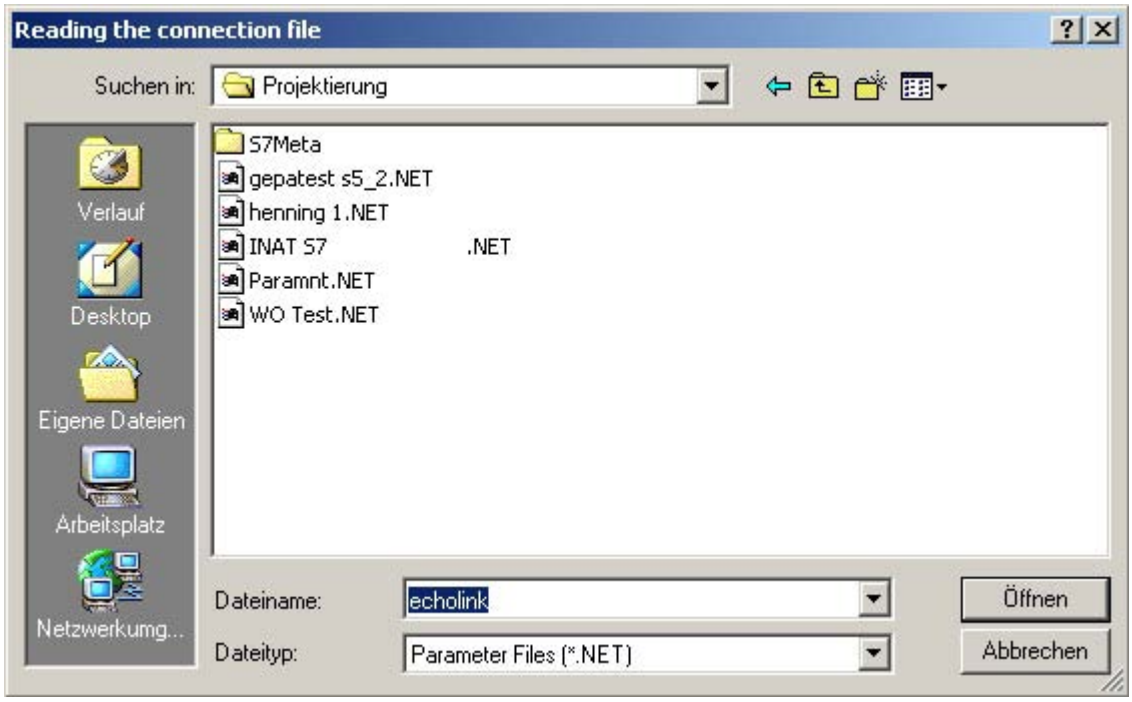


Figure 3-10: Reading the connection file

- The window to select the system appears:

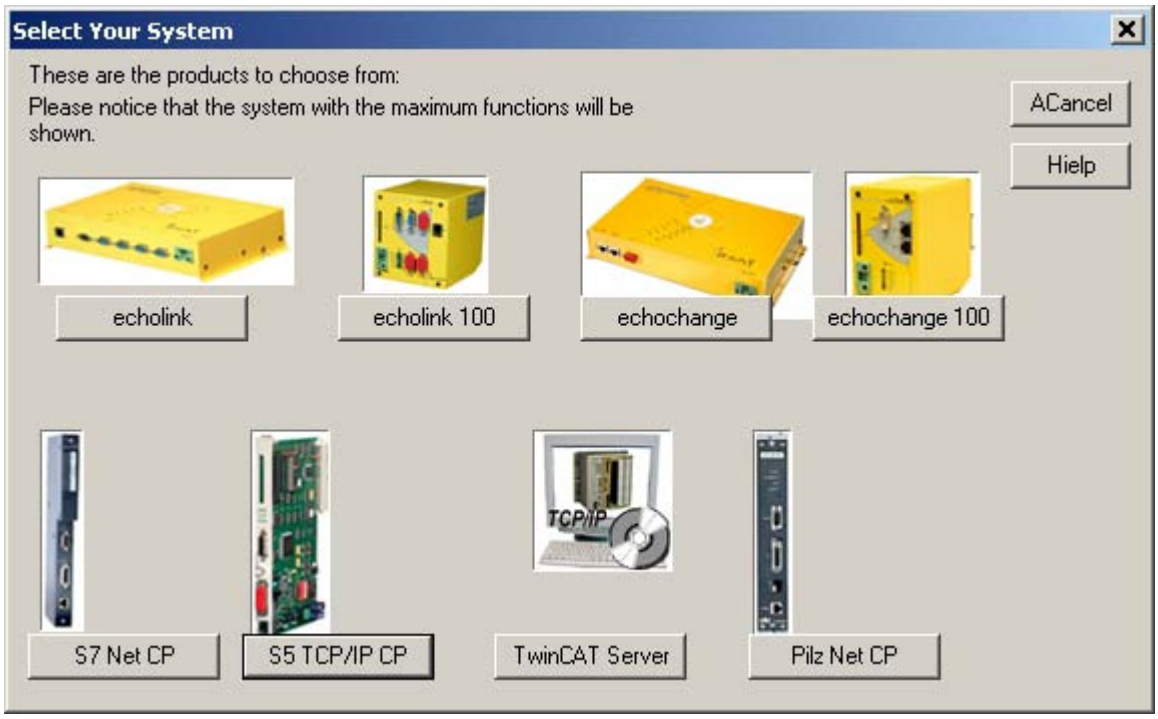


Figure 3-11: Select the system

- Click the button echolink 100“. The empty connection list appears:

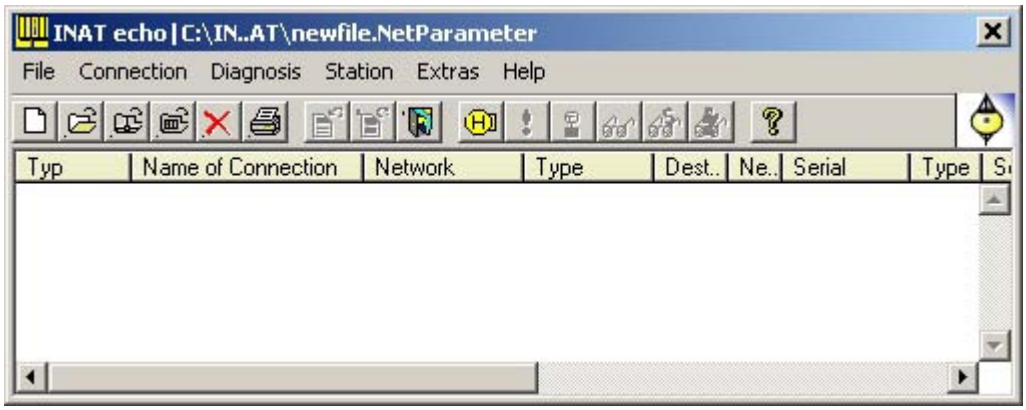


Figure 3-12: Empty connection list

- Select Station > Current Station Adapter 1...
- The window “Station Parameter Settings“ appears
- See table Station parameter settings on page 30 to learn which entries can be made here.
- Confirm your entries with “OK“.
- The parameters are stored in the file selected at the beginning. This file has to be transferred to the echolink (serial or via network).

3.7 Setting MPI station parameters

- When using MPI, in addition to the station parameters, the MPI station parameters must be edited. Select ***Station > MPI station parameters***

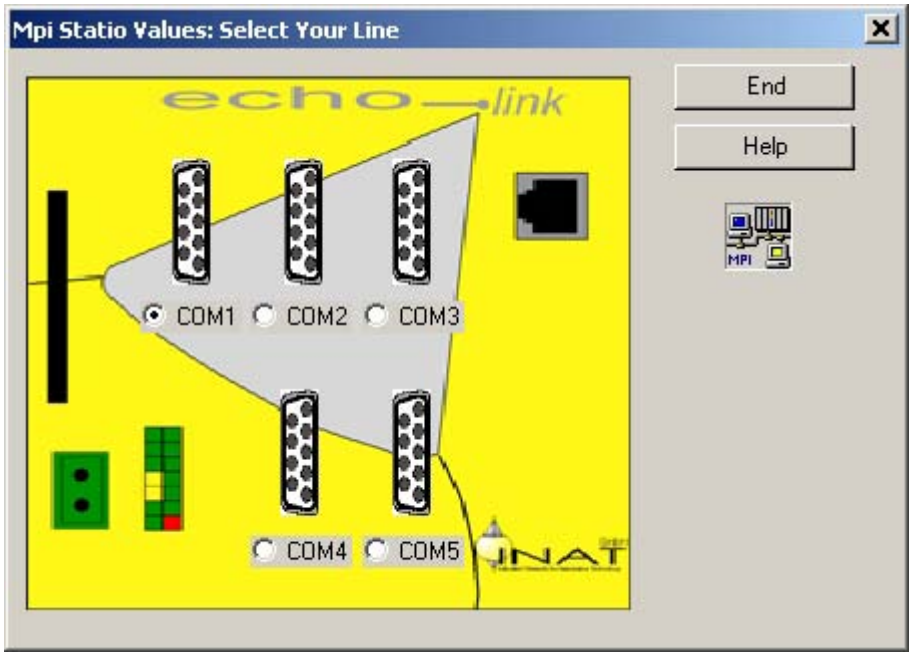


Figure 3-13: MPI Station parameters: Select the Com Port

- Select the COM port of the echolink where MPI will be used
- The following window appears

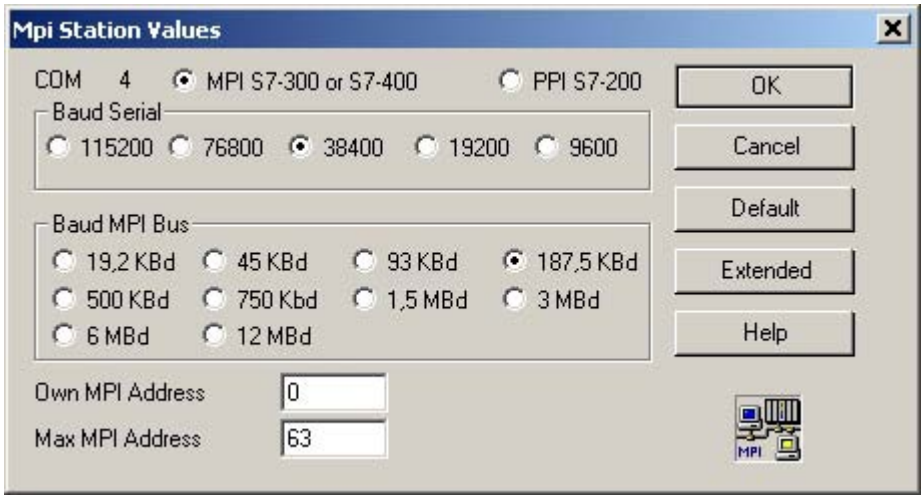


Figure 3-14: Editing MPI station parameters

MPI STATION PARAMETERS
COM
The selected COM port is indicated here
MPI S7-300 or S7-400; PPI S7-200
Select MPI if the echolink will communicate with a S7-400/300 via the MPI protocol. Select PPI if the echolink shall communicate with a S7-200 via the PPI protocol. The echolink recognizes automatically if there is MPI onboard or not.
Baudrate Serial
Enter the baud rate for the serial line, if a RS242- MPI/PPI converter is being used for the connection between S7 PLC and echolink.
Baudrate MPI Ring
Enter the baud rate of the MPI Ring here
Your Own MPI Address
Enter your own MPI address here
Highest MPI Address
Enter the highest MPI address here

Table 3-3: MPI station parameters

- With the Button „Extended“ more parameters can be edited

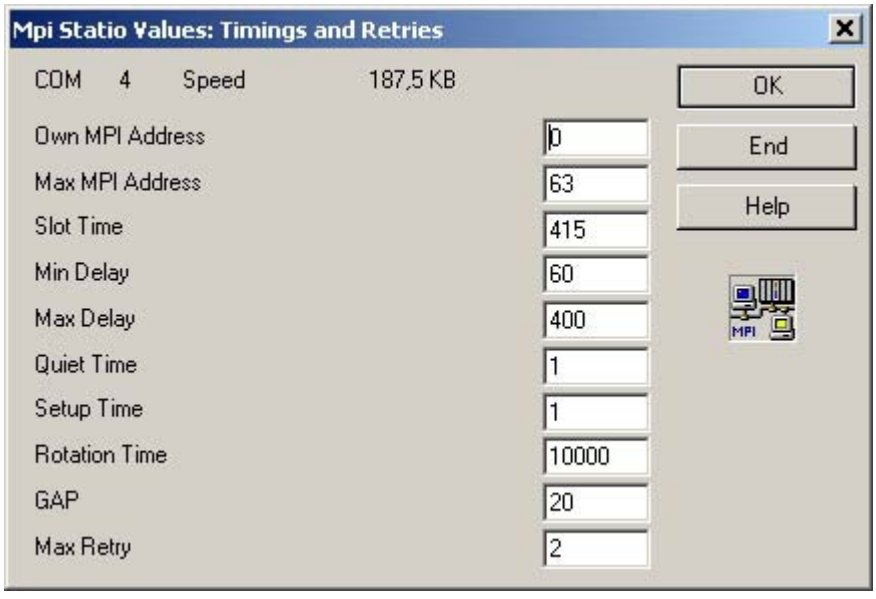


Figure 3-15: MPI Extended Station Parameters: Timings and Retries

MPI STATION PARAMETERS: TIMINGS AND RETRIES
Your Own MPI Address
Your Own MPI address is indicated here
Max MPI Address
Highest MI address of the MPI subnet is indicated here
Slot Time
Slot Time is the maximum time that the sender waits for a reply from the addressed station.
Quiet Time
Time between two requests
Setup Time
Time that can elapse between receiving a data frame and reacting to it.
Rotation Time
Target rotation time Each master compares the target rotation time with the actual token rotation time. The difference between the two decides how much time the MPI station has to send its own data frames.
GAP
Enter the GAP update factor here. The gap between the local MPI address to the next MPI address is known as the GAP. The GAP update factor specifies how many token rotations the master waits before checking whether there is another master in the GAP. Example: GAP = 5 ==> Each master checks whether a new master is located between its own MPI address and the MPI address of the next master after approx. 5 token rotations.
Max Retry
Maximum number of retries

Table 3-4: MPI station parameters: Timings and retries

Please note that the values you edit here depend on each other (exception MPI address). Changes should be handled with care.

- The configuration is complete. Connections can be parameterized now.

4 Parameterization

After you have set up the station parameters and MPI station parameters, connections can be established. A connection always consists of two parts: the serial side and the network side. For each side the corresponding parameters must be edited.

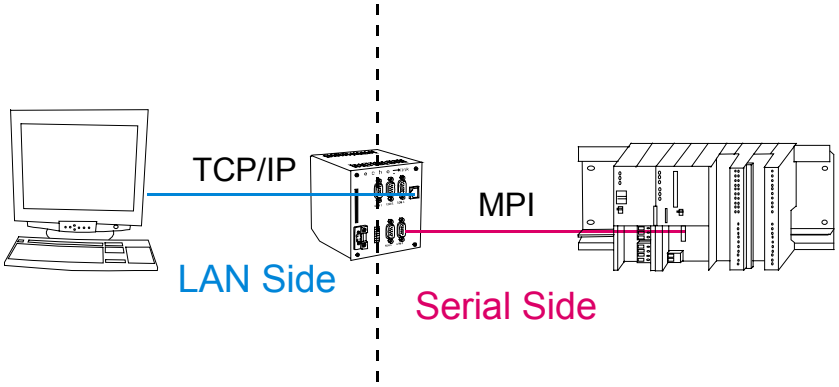


Figure 4-1: Serial Side and network side of a connection

On the network side, you enter the parameters for the connection between echolink and the device in the Ethernet network (e.g. a PC). On the serial side, you enter the parameters for the connection between echolink and the serial device connected to the echolink (e.g. a S7 PLC with MPI interface).

The following steps are executed, when setting up a connection:

- Selection of parameterization mode
- Selecting the transport protocol in Ethernet (TCP/IP or H1)
- Selecting the protocol of the serial interface (e.g. Telnet, AS511, MPI)
- Selecting the application protocol in Ethernet (e.g. S5, S7, Modbus on TCP)
- Editing network parameters (e.g. IP address, TSAPs, Port)
- Editing serial parameters (e.g. baud rate, parity bit, job type)

- Start the parameter setting software. The start dialogue appears:

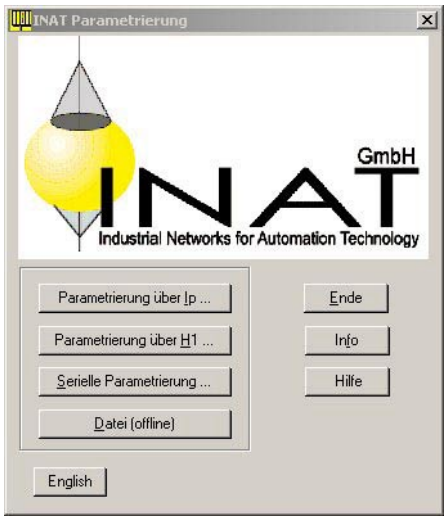


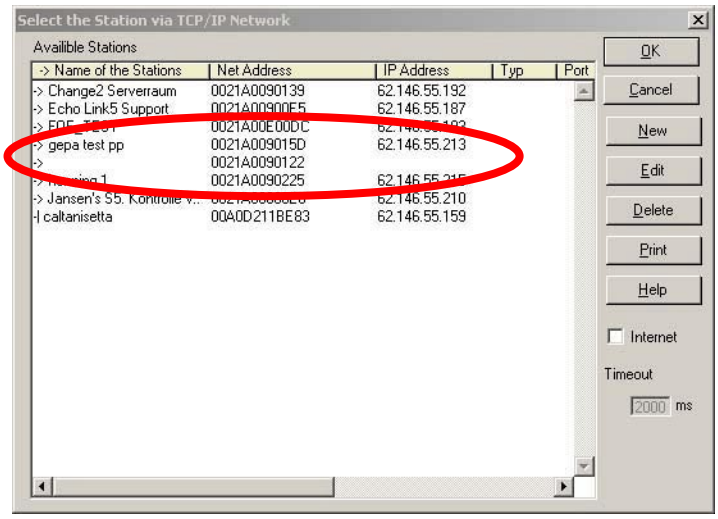
Figure 4-1: Start dialogue window

- Four methods of setting the parameters are provided here:

Parameter Setting Method:	Function
Set Parameters via IP / H1	For setting parameters via IP / H1 the echolink has to be connected indirectly with the PC via the Ethernet network. This method of setting parameters permits you to set parameters for modules from any point of a TCP/IP or H1 network.
Set Parameters using a serial connection	To set parameters using a serial connection the PC and echolink have to be connected directly via null modem cable. When the serial connection is used, the cable length is usually limited to a few meters (i.e., the module must have its parameters set on Side).
File (offline)	With Offline the parameter files are stored locally in a file on the PC for later transmission to the echolink.

4.1 Parameterization online via TCP/IP or H1

- Select “Parameterization via TCP/IP...“or “Parameterization via H1“. The station list appears.



Station not found

- Stations located behind routers are not automatically detected.

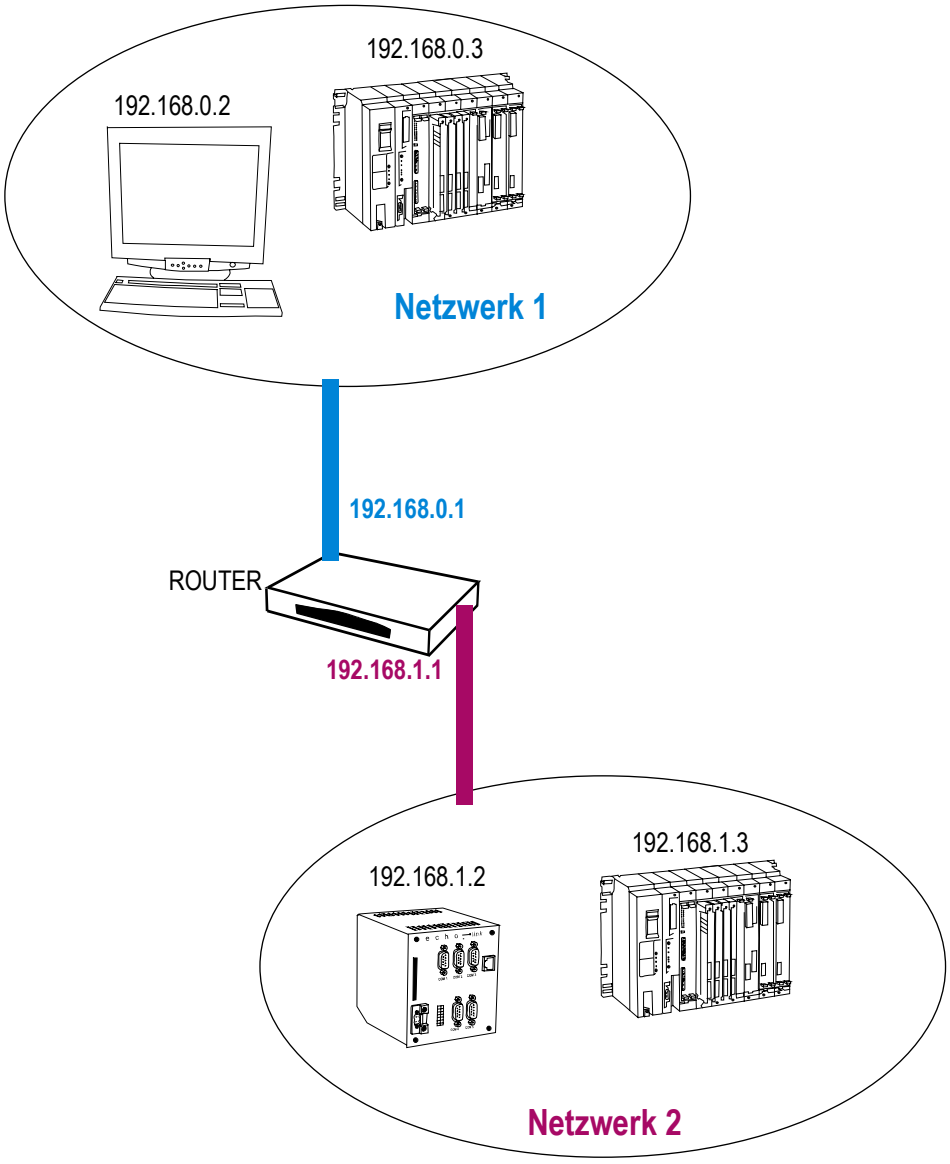


Figure 4-2: Station behind router

- Establish a direct connection to the desired station clicking the button „New“

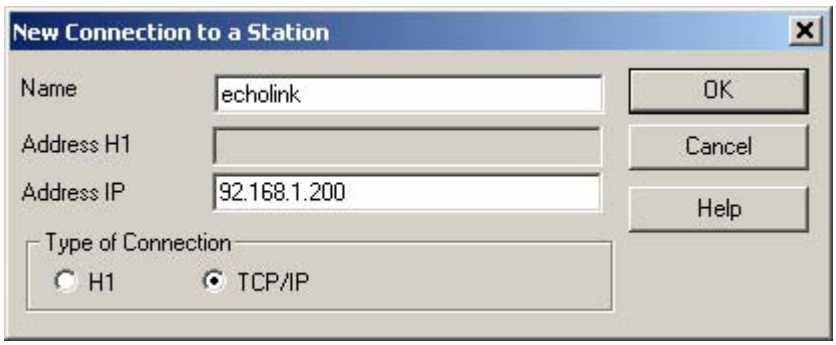


Figure 4-3: New Connection to a station

- Enter the name and the IP address of the echolink station (these parameters have been defined during the registration process as described in chapter 3.6) and click the button “OK“. The new station is indicated in the station list. If there is an arrow in front of the station (->) the station is reachable.

▪ Mark the echolink station in the station list and click the button “OK“. The empty connection list appears.

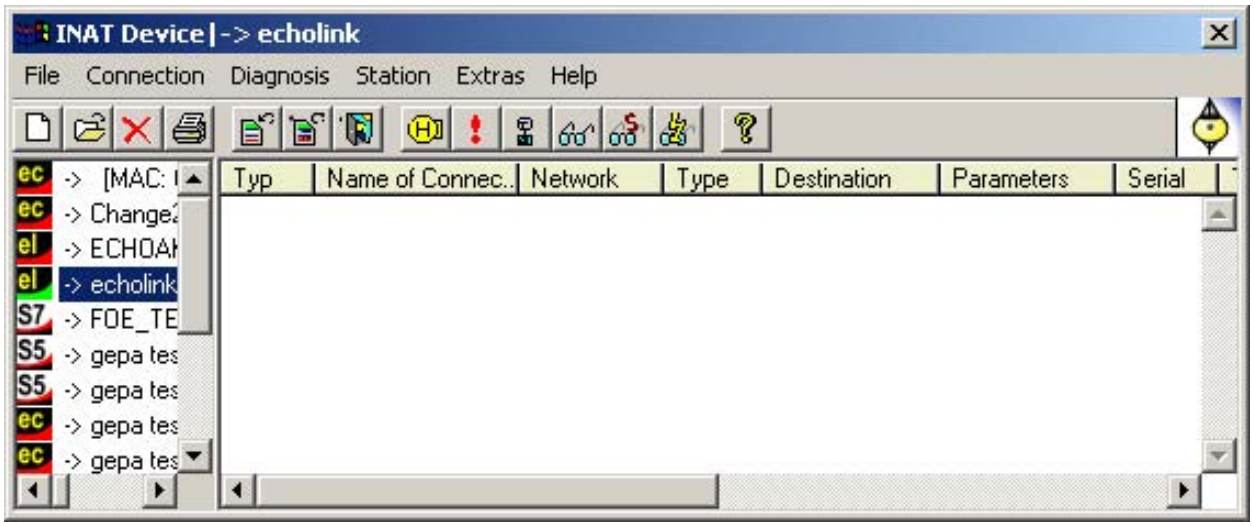


Figure 4-4: Empty connection list with serial parameterization

- To set up a new connection select ***Connection > New***. The window “New connection“ appears.

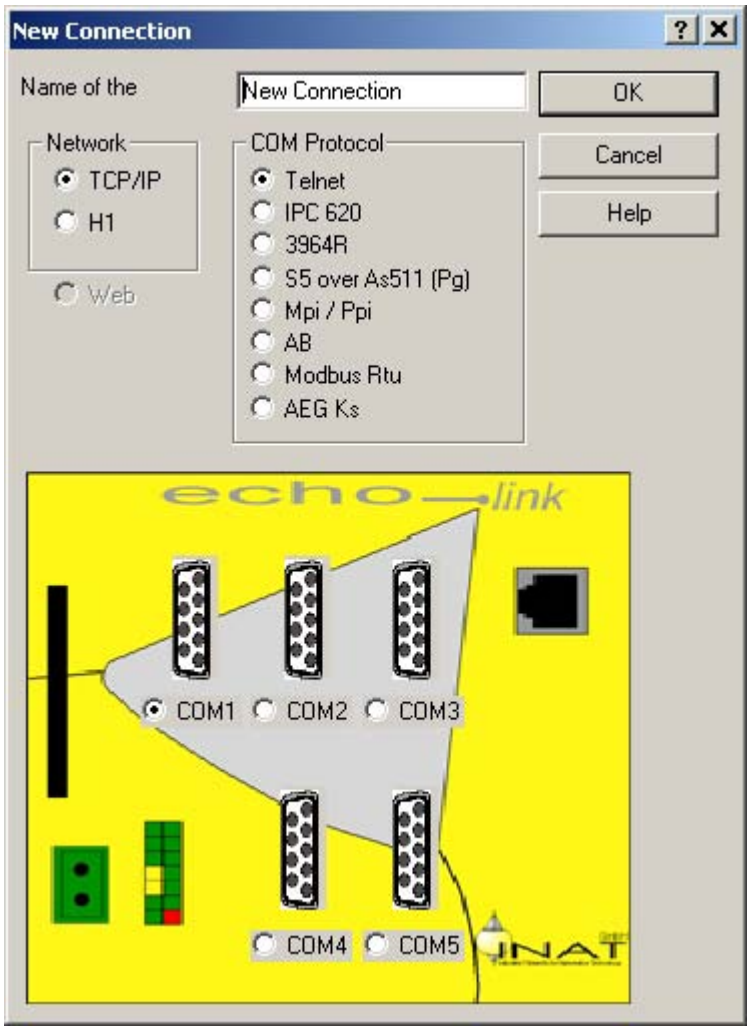


Figure 4-5: Setting up new connection

- In this dialog you decide which protocol conversion will be performed.

NEW CONNECTION
Connection Name
All parameterization data is allocated to the connections. Every connection is identified by a connection name.
Network
Here you select the desired transport protocol in the Ethernet network: TCP/IP or H1 (select TCP/IP when using RFC1006)

Continuation next page….

NEW CONNECTION
Com Protocol
Here you select the protocol of the serial interface ➢ Telnet ➢ IPC 620 ➢ 3964R ➢ S5 über AS511 (PG) ➢ Mpi / Ppi ➢ AB ➢ Modbus RTU
COM Port COM 1 up to COM 5
Here you select the COM port of the echolink that will be parameterized (the COM port that is connected with the serial device). The interfaces are active or inactive (grey) depending on hardware.

Table 4-1: Parameters for new connection

- Confirm your entries with “OK“. The window “Network PLC protocol“ appears

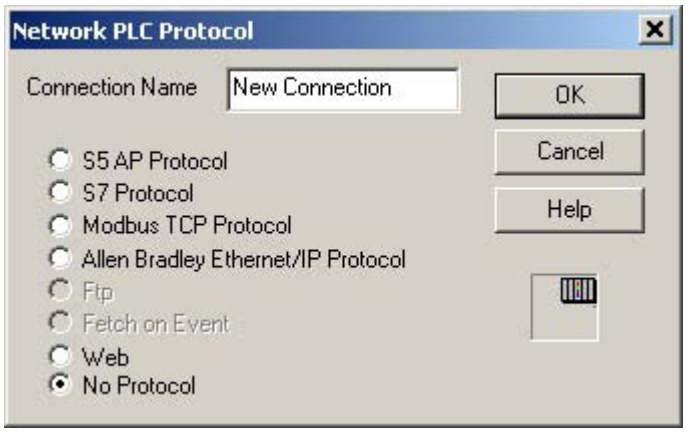


Figure 4-6: Selecting the application protocol used in Ethernet

- Here you select the application protocol (higher protocol = protocol of the higher levels used in ISO/OSI model) used in Ethernet. Select „no protocol“, if there is no protocol used. i.e. if raw data shall be transferred (Send / Receive communications). If there is an application protocol used, the job type is always Fetch/Write.
- Confirm with “OK“. The window “TCP/IP Parameters“, or “H1 Parameters“, appears.

4.1.1 Setting TCP/IP Parameters

Here you edit the TCP/IP parameters that are required for the connection between echolink and the device in the Ethernet network.

TCP/IP PARAMETERS
Name
The connection name can be changed here
Destination IP Address
In a TCP/IP network each station is addressed with a unique destination address. If the connection is set “active“, enter the IP address of the communication partner. If the connection establishment is “passive“ enter a joker address (0.0.0.0).
Port
The port number is a 16-bit address from 0 to 65535. It specifies the channel via which the applicable connection is to be established. You should use a port between 1024 and 65535. On both sides of the connection, the port number must be the same. ***Port number RFC1006*** RFC1006 uses port number 102. When activating the button RFC1006, the port number is set automatically. ***Port number Modbus on TCP*** Modbus communications uses a defined port as well, # 502. Unlike the RFC1006, this port can be parameterized. Note: On both sides of the connection, the port number must be the same.
Connection active / passive
Select the type of connection establishment (i.e. which station is to initiate connection establishment). At regular intervals, the active station attempts to set up the appropriate connection.
Protocol TCP / UDP
The TCP is a secure protocol with checksum and acknowledgment. UDP is not protected. It is handled by datagram services.
Special Settings
PLC Header
If you activate this button for the TCP/IP communication you are provided with the optimized data transmission to the PLC. Apart from a frame counter the INAT PLC Header also contains length information and the possibility to send acknowledges (see chapter 7.1. “PLC Header“, in the appendix). Continuation next page….

TCP/IP PARAMETERS
Life Data Acks
This item activates the connection monitoring function which is restricted in many socket libraries. The default setting of the life data acks is “activated“.
RFC1006
TCP/IP data is transferred as a stream. With the activation of RFC1006 this stream is transferred block-wise. With that special TCP/IP channel you are able to communicate with the Siemens CPs of the S5 and S7 series. Click the button RFC1006 to edit the TSAPs
Your Own TSAP, remote TSAP
Your own TSAP (Transport Service Access Point) specifies the connection address in the system by which data is to be exchanged. Remote TSAP specifies the connection address of the other system. To be able to establish the connection, your Own TSAP must correspond to the TSAP of the other system. This requirement is easy to meet since Your Own TSAP and Remote TSAP may be the same. TSAPs are 2 bytes up to 16 bytes in length.
Further Settings
Further settings provide special parameters for working with TCP/IP. Normally you do not need them. Further information on these parameters can be found in appendix.

Table 4-2: Setting TCP/IP Parameters

4.1.2 Setting H1 Parameters

Here you edit the H1 Parameters, that are required for the connection between echolink and the device in the Ethernet network.

H1 PARAMETERS
Name
The connection name can be changed here
Ethernet Address
If the connection is set „active“, enter the Ethernet address of the station in the H1 network that will communicate with the serial device (via echolink).
Your Own TSAP, remote TSAP
The own TSAP (Transport Service Access Point) specifies the connection address in the system by which data is to be exchanged. Remote TSAP specifies the connection address of the other system. To be able to establish the connection, the own TSAP must correspond to the TSAP of the other system. This requirement is easy to meet since Your Own TSAP and Remote TSAP may be the same. TSAPs are 2 bytes up to 16 bytes in length.
CR Parameter
With ISO (H1) a transport connection is established by sending a CR TPDU (Connection Request Transport Protocol Data Unit) by an active transport instance. With this CR TPDU several parameters are transferred to the partner such as desired TPDU size, format of the TPDUs etc. Check the user‘s guide of the destination system to determine what, if anything, must be entered here. If no information is available, no CR parameters should be entered.
Multicast
Multicast connections are connections which are not directed to all stations and which only address the stations which have the same multicast circle number. The number is between 0 and 63. If Multicast is not selected as the „Line type“, the value for Multicast circle can be disregarded.
Connection active / passive
Select the type of connection establishment (i.e. which station is to initiate connection establishment). At regular intervals the active station attempts to set up the appropriate connection. Continuation next page….

H1 PARAMETERS
Line Type
The “Line type“, specifies whether the frames of this connection will be sent to all stations (i.e., Broadcast), whether a certain group of stations is to be reached (i.e., Multicast), whether secure connection is to be used (i.e., Normal), or whether the data is to be transferred without protection (i.e., Datagram).
Priority
The line priority can vary from 0 (i.e., highest priority) to 4 (i.e., lowest priority). 0 and 1 are the so-called express priorities while 2 and 3 are the normal priorities. Priority 4 is only used infrequently since a new connection must be established for each sending job. If used infrequently, this priority does not place as much of a strain on the network as other priorities since the line is not monitored (i.e., the connection is disconnected after each sending job). Remember that the express priorities do not make transmission faster than the normal priorities. On some controllers, however, the data are transferred to working storage via interrupt when priority 0 is used. This can make the total data transmission faster, up to 16 bytes is permitted for priorities 0 and 1.

Table 4-3: Setting H1 Parameters

- Click the button “OK“. The window to edit the serial parameters appears

4.1.3 Editing serial parameters

Depending on the selected serial protocol, a window to edit the serial parameters appears. Here you enter the parameters that are required for the connection between echolink and the serial device.

SERIAL PARAMETERS	
Connection Telnet	Description in Chapter 4.1.3.1
Connection IPC620	Description in Chapter 4.1.3.2
Connection 3964R	Description in Chapter 4.1.3.3
Connection S5 over AS511	Description in Chapter 4.1.3.4
Connection MPI	Description in Chapter 4.1.3.5
Connection Modbus RTU	Description in Chapter 4.1.3.6

4.1.3.1 Connection Telnet

When selecting Telnet, the following window appears:

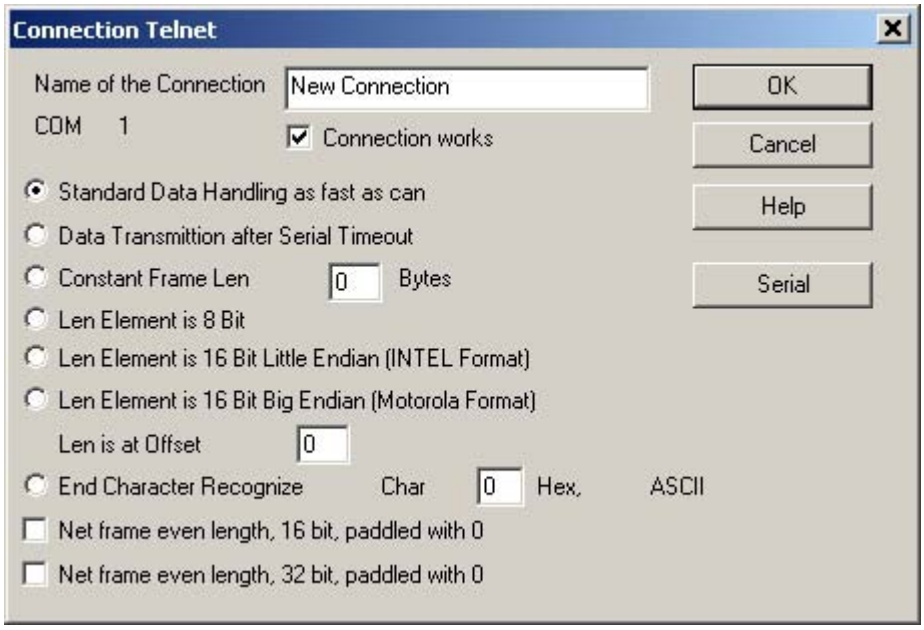


Figure 4-7: Settings for serial Telnet connection

The following entries can be made here:

TELNET
Connection name
The connection name is indicated here
Connection works
A parameterized connection can be deactivated and the parameters are not lost! The connection can be reactivated with the same parameters again. As default connections are active.
Data Handling as fast as can
Data is transferred as fast as possible.
Data Transmission after serial Timeout
After every character, the timeout is checked. After time has expired without another character, the collected data is transferred in one frame.
Constant Frame Len [in bytes]
Characters are read until the constant frame len is reached (maximum 2 KB). Then the characters are sent in one frame.
Len Element is 8 Bit
The length of an element is constantly 8 bit.
Len Element is 16 Bit Little Endian (INTEL Format)
The adjectives *big-endian* and *little-endian* refer to which bytes are most significant in multi-byte data types and describe the order in which a sequence of bytes is stored in a computer's memory. In a little-endian system, the least significant value in the sequence is stored first. Little Endian systems are INTEL, VAX, DEC et al.
Len Element is 16 Bit Big Endian (Motorola Format);
In a big-endian system, the most significant value in the sequence is stored at the lowest storage address (i.e., first). Big Endian systems are Motorola, SPARC, IBM et al.
Net frame even length 16 bit, paddled with 0
The frame is paddled with „0", so that it becomes a 16 bit frame. This can be necessary with S5, Modicon or Pilz PLCs, where the basic element is 16 Bit.
Net frame even length 32 bit, paddled with 0
The frame is paddled with "0", so that it becomes a 32 bit frame. This can be necessary with CNC & PLCs where the basic element has a length of 4 bytes

Table 4-4: Setting Telnet Parameters

With the button „serial“, you can edit parameters for the serial line.

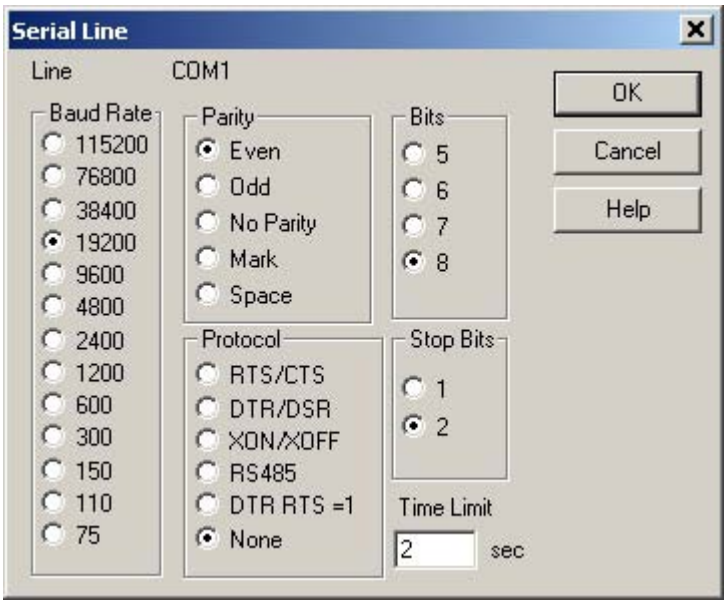


Figure 4-8: Serial Line Settings

SERIAL LINE

Baud Rate

Baud rate is the number of signal level changes per second in a line, regardless of the information content of those signals. The baud rate must be the same for sender and receiver.

Parity

The parity must be the same for sender and receiver

Even	With even parity the number of ones - including the parity bit - is even
Odd	With odd parity the parity bit is set in such a way that the number of ones is odd - including parity bit
None	Do not select, if the parity check is not used.
Mark	Select Mark, if the parity bit constantly 1 used i.e. if your equipment expects a parity bit of 1
Space	Select space, if the parity bit constantly 0 used i.e. if your equipment expects a parity bit of 0

Continuation next page….

SERIAL LINE

Protocol

Here you select the protocol. You can control data flow using one of these methods:

– Hardware handshaking
– Software handshaking

Hardware handshaking:
Hardware handshaking uses specific serial port pins to control data flow. In most cases, these are the RTS and CTS pins.

Software handshaking:

Software handshaking uses specific ASCII characters to control data flow. These characters are e.g. Xon and Xoff

RTS / CTS	RTS = Request to Send CTS = Clear to Send
DTR / DSR	DTR = Data Terminal Ready DSR = Data Set Ready
XON / XOFF	XON: Resume data transmission. XOFF: Pause data transmission.
RS485	Select RS485, if the serial device is connected to echolink via a RS485 cable.
DTR RTS = 1	Select DTR RTS = 1, if DTR or RTS have the constant value „1“
None	Select None, if none of the listed protocols above be used for the serial line

Bits

Enter the bits per character here: 5, 6, 7 or 8

Stop bits

The last part of a character frame consists of 1 or 2 stop bits. These bits are always represented by a negative voltage. If no further characters are transmitted, the line stays in the negative condition. The transmission of the next character frame, if any, is preceded by a start bit of positive (SPACE) voltage.

Time limit in sec

The time limit indicates the maximum time difference between two received characters.

Table 4-5: Parameters for serial line

Confirm your entries with „OK“. The connection list appears again. The new parameterized connection is indicated.

4.1.3.2 Connection IPC620

When selecting IPC620, the following window appears:

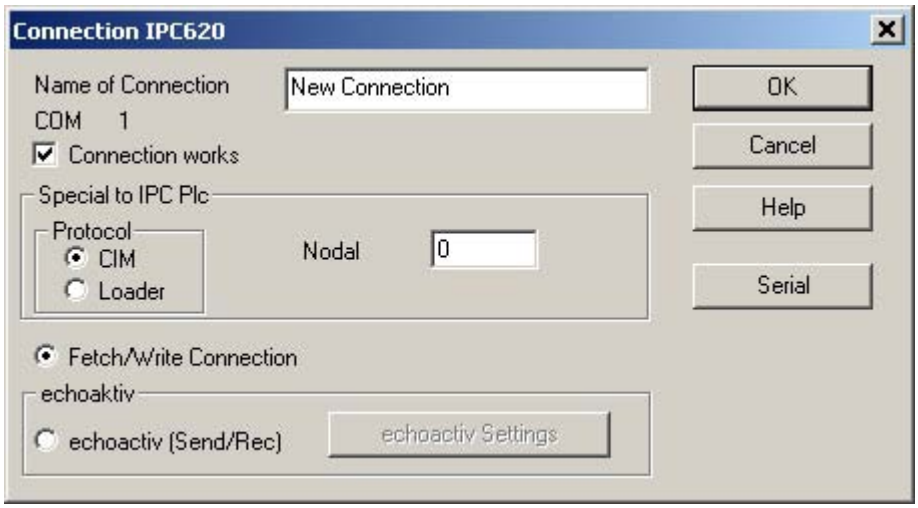


Figure 4-9: Parameter Settings for IPC620 connection

The following entries can be made here:

SERIAL PARAMETERS IPC 620
Connection Name
The connection name can be changed here.
Connection works
A parameterized connection can be deactivated and the parameters are not lost! The connection can be reactivated with the same parameters again. As default connections are active.
Special to IPC PLC   ***Protocol CIM / Loader***
The serial connection can be handled via the loader interface or via the CIM interface.   **Loader**: the parameters of the serial interface are predefined   **CIM**: the parameters of the serial interface are defined under “Serial”
Fetch / Write Connection
Activate this button if the IPC 620 will execute a Fetch passive or a Write passive job (Layer 7 communication). In this case the Ethernet station reads data actively from the IPC 620 (Fetch active, read job) or write actively into the IPC 620 (Write active).
echoactive (Send/Rec)
Use the echoactive function if the IPC620 will execute active jobs. Read chapter 4.4 to learn more about the echoactive function.

With the “serial“ button, you can edit parameters for the serial line. To learn which parameters can be edited here, refer to table Parameters for serial line on page 52.

The following table shows in overview, which entries are required on the serial side, to execute the desired job type to the desired Ethernet partner.

Protocol IPC 620

	S5-AP	S7 Protocol	Modbus on TCP	Allen Bradley	No Protocol
Fetch passive	Fetch/Write	Fetch/Write	Fetch/Write	Fetch/Write	----------
Write passive	Fetch/Write	Fetch/Write	Fetch/Write	Fetch/Write	----------
Send (Raw)	----------	----------	----------	----------	echoactive, type normal, data to send
Receive (Raw)	----------	----------	----------	----------	echoactive, type normal, received data
Fetch active Source = Destination Source # Destination	echoactive, type „PLC gives parameters“, parameter block	echoactive, type „PLC gives parameters“, parameter block	echoactive, type „PLC gives parameters“, parameter block	echoactive, type „PLC gives parameters“, parameter block	----------
Write active Source = Destination	echoactive, type normal, data to send	echoactive, type normal, data to send	echoactive, type normal, data to send	echoactive, type normal, data to send	----------
Write active Source # Destination	echoactive, type „PLC gives parameters“, parameter block	echoactive, type „PLC gives parameters“, parameter block	echoactive, type „PLC gives parameters“, parameter block	echoactive, type „PLC gives parameters“, parameter block	----------

Figure 4-10: Required Settings in the parameterization software: On the left side the job types of the serial IPC 620 device are indicated. On the right side, the protocol of the communication partner in Ethernet is indicated

4.1.3.3 Connection 3964R

Select the 3964R protocol, if the communication with the serial device will be handled via procedure 3964 / 3964R or the procedure RK512 (via 3964 or via 3964R).

When selecting 3964R, the following window appears:

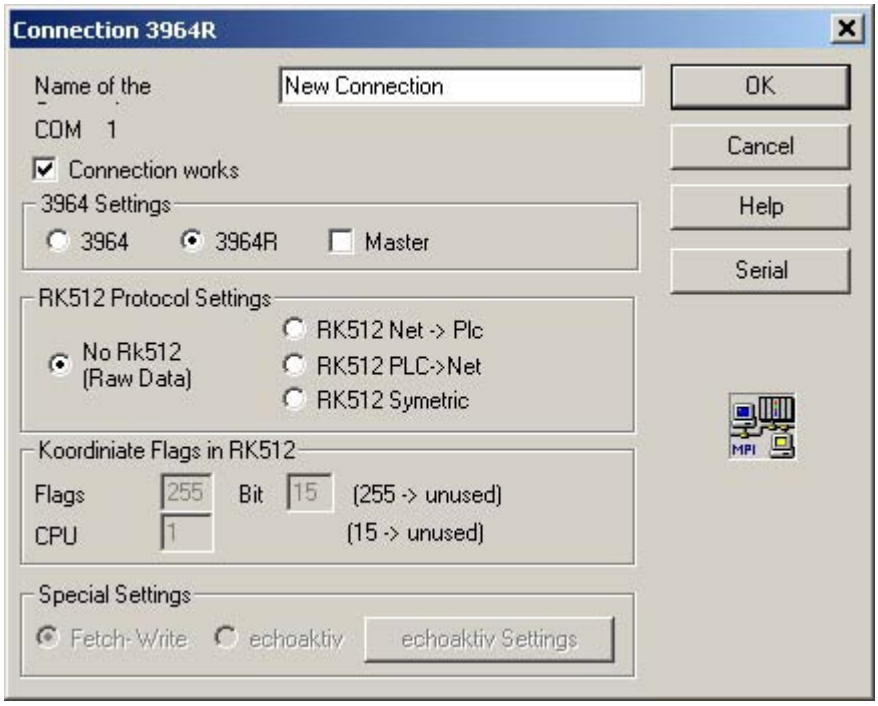


Figure 4-11: Parameter Settings for 3964R connection

The following entries can be made here:

SERIAL PARAMETERS 3964R
Connection Name
The connection name can be changed here
Connection works
A parameterized connection can be deactivated and the parameters are not lost! The connection can be reactivated with the same parameters again. As default connections are active.

Continuation next page….

SERIAL PARAMETERS 3964R

3964 Settings

3964	Procedure 3964 or procedure RK512 via 3964 (i.e. **NO** block check character)
3964R	Procedure 3964 or procedure RK512 via 3964R (i.e. **WITH** block check character)
Master	Here you can define the priority. One partner must have low priority (no master) the other one must have high priority (master) otherwise initialization conflicts can not be handled.

RK512 Protocol Settings

No RK512	Select “No RK512“, if procedure 3964 or 3964R will be used. In this case, raw data is transferred. No other settings are required.
RK512 Net -> PLC	Activity comes from the Ethernet side. The job type Fetch active, Write active is executed by the station in Ethernet to the serial side (e.g. read actively data from the PLC via OPC communication).
RK512 PLC -> Net	Activity comes from the serial side. The job type Fetch active, Write active is executed by the station that is serially connected to echolink.
RK512 Symmetric	Activity comes from both sides. The serial side as well as the Ethernet side execute active jobs.

Continuation next page….

SERIAL PARAMETERS 3964R
Coordination Flags
Coordination flags are only of importance for the procedure RK512. The procedures 3964 / 3964R do not use these flags. **Use Coordination Flag** If you want to use a coordination flag, enter byte number and bit number of the coordination flag here. Each coordination flag occupies a flag bit in the flag area of the CPU. For range of values, please refer to the manual of your CPU. When assigning a coordination flag, check whether the communications partner can also evaluate it. **Do not use Coordination Flag** If you do not want to use the coordination flag, read in the manual of your CPU what to do. Many systems use flag 255, Bit 15 to indicate, that no coordination flag is used. This is the default value. ***CPU*** Enter the CPU number, to which the coordination flag refers. Default value is “1”. If no coordination flag is used, the CPU must be designated as unused. Therefore many systems use the value “15”. Refer to your manual of the CPU to read what to do.
Special Settings
Special settings are only available, when using RK512.
Fetch / Write
Select Fetch / Write for active jobs (job types Fetch active/passive, Write active/passive).
echoactive
The functional range depends from CP to CP. Therefore the echoactive function is available: With this function active jobs can be executed.

With the “Serial” button you can edit the parameters of the bit layer. Please note, that the parameters must be the same on both communication nodes. To learn which parameters can be edited here, please refer to Table 4-5 on page 52.

The following table shows in overview, which entries are required on the serial side, to execute the desired job type to the desired Ethernet partner.

Protocol RK512 and 3964(R)

	S5 AP	S7 Protocol	Modbus on TCP	Allen Bradley	No Protocol
Fetch passive	RK512 Net -> PLC, Fetch/Write	RK512 Net -> PLC, Fetch/Write	RK512 Net -> PLC, Fetch/Write, Modbus table	RK512 Net -> PLC, Fetch/Write, AB table	----------
Write passive	RK512 Net -> PLC, Fetch/Write	RK512 Net -> PLC, Fetch/Write	RK512 Net -> PLC, Fetch/Write, Modbus table	RK512 Net -> PLC, Fetch/Write, AB table	----------
Send (Raw)	----------	----------	----------	----------	No RK512
Receive (Raw)	----------	----------	----------	----------	No RK512
Fetch active	RK512 PLC -> Net, Fetch/Write	RK512 PLC -> Net, Fetch/Write	RK512 PLC -> Net, Fetch/Write, Modbus table	RK512 PLC -> Net, Fetch/Write, AB table	----------
Write active	RK512 PLC -> Net, Fetch/Write	RK512 PLC -> Net, Fetch/Write	RK512 PLC -> Net, Fetch/Write, Modbus table	RK512 PLC -> Net, Fetch/Write, AB table	----------

Figure 4-12: Required Settings in the parameterization software: On the left side the job types of the serial 3964R device are indicated. On the right side, the protocol of the communication partner in Ethernet is indicated

4.1.3.4 Connection S5 over AS511 (PG)

Selecting S5 over AS511 (PG), the following window appears:

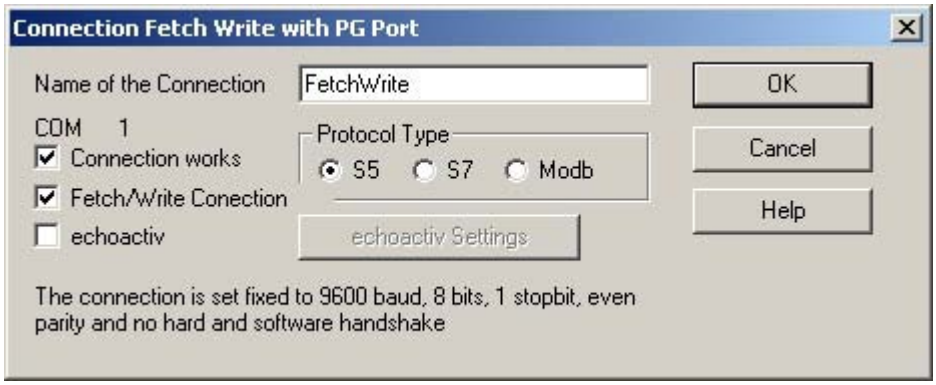


Figure 4-13: Parameter Settings for AS511 connection

The following entries can be made here:

SERIAL PARAMETERS S5 OVER AS511
Connection Name
The connection name can be changed here
Connection works
A parameterized connection can be deactivated. The parameters are not lost! The connection can be activated with the same parameters again. As default connections are active.
Net Protocol Type
The application protocol is indicated here
Special Settings
Special settings are only available, when using RK512.
Fetch / Write
Activate this button, if the S5 PLC shall receive data passively (Write passive) or shall send data passively (Fetch passive).
echoactive
Use the echoactive function if the S5 will execute active jobs (Send / receive Direct, Fetch active, Write active). Read chapter 4.4 to learn more about the echoactive function.

The parameters of the bit layer are fixed with 9600 Baud, 8 bits, parity even and 1 stop bit.

The following table shows in overview, which entries are required on the serial side, to execute the desired job type to the desired Ethernet partner.

Protocol AS511

	S5 AP	S7 Protocol	Modbus on TCP	Allen Bradley	No Protocol
Fetch passive	Fetch / Write	Fetch / Write	Fetch / Write, Modbus table	Fetch / Write, AB-Tabelle	----------
Write passive	Fetch / Write	Fetch / Write	Fetch / Write, Modbus table	Fetch / Write, AB-Tabelle	----------
Send (Raw)	----------	----------	----------	----------	echoactive, type normal, data to send
Receive (Raw)	----------	----------	----------	----------	echoactive, type normal, received data
Fetch active Source = Destination Source # Destination	echoactive, type „PLC gives Parameters“, parameter block	echoactive, type „PLC gives Parameters“, parameter block	echoactive, type „PLC gives Parameters“, parameter block, Modbus table	echoactive, type „PLC gives Parameters”, parameter block, AB table	----------
Write active Source = Destination	echoactive, type normal, data to send	echoactive, type normal, data to send	echoactive, type normal, data to send, Modbus table	echoactive, type normal, data to send, B table	----------
Write active Source # Destination	echoactive, type „PLC gives Parameters“, parameter block	echoactive, type „PLC gives Parameters“, parameter block	echoactive, type „PLC gives Parameters“, parameter block, Modbus table	echoactive, type „PLC gives Parameters“, parameter block, AB table	----------

Figure 4-14: Required Settings in the parameterization software: On the left side the job types of the serial AS511 device are indicated. On the right side, the protocol of the communication partner in Ethernet is indicated

4.1.3.5 Connection MPI

Selecting MPI / PPI the following window appears

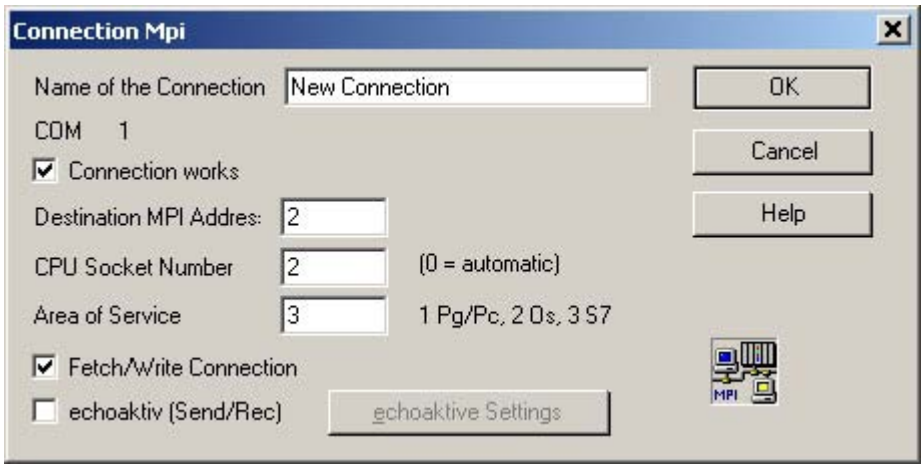


Figure 4-15: Parameter Settings for MPI connection

The following entries can be made here:

SERIAL PARAMETERS MPI
Connection Name
The connection name can be changed here
Connection works
A parameterized connection can be deactivated and the parameters are not lost! The connection can be reactivated with the same parameters again. As default connections are active.
Destination MPI Address
Enter the MPI address of the communications partner here.
CPU
Enter the socket number of the CPU in the PLC
Area of service
Enter the area of service here
Fetch / Write
Select Fetch / Write for passive jobs (job types Fetch active/passive, Write active/passive).
echoactive
Use the echoactive function if the S7 will execute active jobs (Send / receive Direct, Fetch active, Write active). Read chapter 4.4 to learn more about the echoactive function.

Table 4-6: Serial Parameters MPI

The following table shows in overview, which entries are required on the serial side, to execute the desired job type to the desired Ethernet partner.

Protocol MPI

	S5 AP	S7 Protocol	Modbus on TCP	Allen Bradley	No Protocol
Fetch passive	Fetch / Write	Fetch / Write	Fetch / Write, Modbus table	Fetch / Write, AB table	----------
Write passive	Fetch / Write	Fetch / Write	Fetch / Write, Modbus table	Fetch / Write, AB table	----------
Send (Raw)	----------	----------	----------	----------	echoactive, type normal, data to send
Receive (Raw)	----------	----------	----------	----------	echoactive, type normal, received data
Fetch active Source = Destination Quelle # Ziel	echoactive, type „PLC gives parameters“, parameter block	echoactive, type „PLC gives parameters“, parameter block	echoactive, type „PLC gives parameters”, parameter block, Modbus table	echoactive, type „PLC gives parameters“, parameter block, AB table	----------
Write active Source = Destination	echoactive, type normal, data to send	echoactive, type normal, data to send	echoactive, type normal, data to send, Modbus table	echoactive, type normal, data to send, AB table	----------
Write active Source # Destination	echoactive, type „PLC gives parameters“, parameter block	echoactive, type „PLC gives parameters“, parameter block	echoactive, type „PLC gives parameters“, parameter block, Modbus table	echoactive, type „PLC gives parameters“, parameter block, AB table	----------

Figure 4-16: Required Settings in the parameterization software: On the left side the job types of the serial MPI device are indicated. On the right side, the protocol of the communication partner in Ethernet is indicated

4.1.3.6 Connection Modbus RTU

Selecting Modbus the following window appears

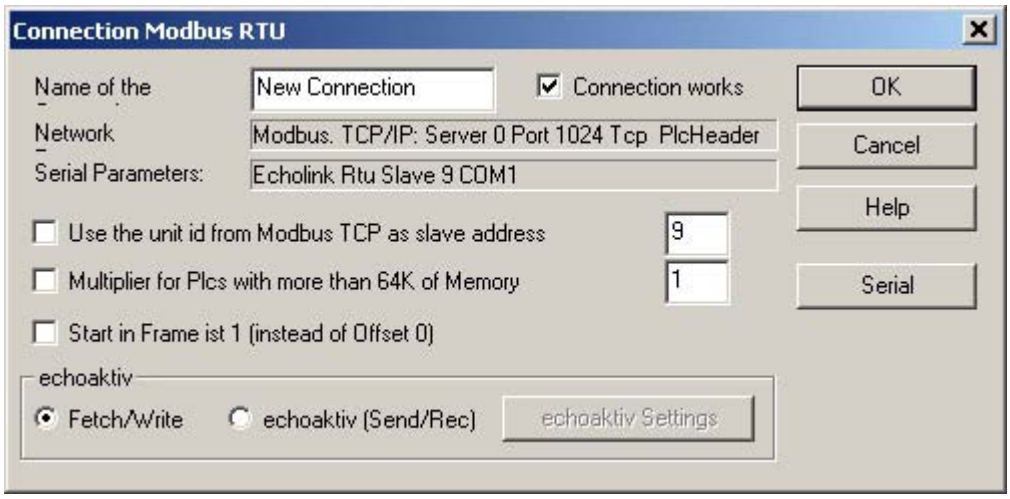


Figure 4-17: Parameter Settings for Modbus connection

The following entries can be made here:

SERIAL PARAMETERS MODBUS RTU
Connection Name
The connection name can be changed here
Connection works
A parameterized connection can be deactivated and the parameters are not lost! The connection can be reactivated with the same parameters. As default connections are active.
Network
Here you see the network parameters already edited
Serial Parameters
Here you see the serial parameters already edited
Use the Unit ID from Modbus TCP as slave address
The slave address of the serial Modbus device does not have to be edited when the Client in the Ethernet supports the Modbus on TCP protocol. In this case, the slave address of the destination device is indicated in the Modbus Header of the request (Unit Identifier Field). Echolink uses this Identifier to redirect the request to the desired slave device. If the partner station in the Ethernet does not support the Modbus-on-TCP protocol, the Slave address **MUST** be edited with “Slave Address”
Multiplier for PLCs with more than 64K of memory
Start in frame is 1 (instead of Offset 0)
Fetch / Write
Select Fetch / Write, if data will be read from the Modbus slave or be written into the Modbus slave. The Modbus device connected with the echolink executes passive jobs (Fetch passive, Write passive)
Echoactive
Use the echoactive function if the Modbus device will execute active jobs (Send / Receive Direct, Fetch active, Write active). Read chapter 4.4 to learn more about the echoactive function.

Table 4-7: Serial Parameters Modbus RTU

With the “Serial” button you edit the parameters of the bit layer. To learn which parameters can be edited here, please refer to Table 4-5 on page 52.

The following table shows, in overview, which entries are required on the serial side, to execute the desired job type to the desired Ethernet partner.

Protocol Modbus RTU

	S5 AP	**S7 Protocol**	**Modbus on TCP**	**Allen Bradley**	**No Protocol**
Fetch passive	Fetch / Write, Modbus table	Fetch / Write, Modbus table	Fetch / Write	----------	----------
Write passive	Fetch / Write, Modbus table	Fetch / Write, Modbus table	Fetch / Write	----------	----------
Send (Raw)	----------	----------	----------	----------	echoactive, type normal, data to send
Receive (Raw)	----------	----------	----------	----------	echoactive, type normal, received data
Fetch active Source = Destination Source # Destination	echoactive, type „PLC gives Parameters“, parameter block, Modbus table	echoactive, type „PLC gives Parameters“, parameter block, Modbus table	echoactive, type „PLC gives Parameters“, parameter block,	----------	----------
Write active Source = Destination	echoactive, type normal, data to send, Modbus table	echoactive, type normal, data to send, Modbus table	echoactive, type normal, data to send,	----------	----------
Write active Source # Destination	echoactive, type „PLC gives Parameters“, parameter block, Modbus table	echoactive, type „PLC gives Parameters“, parameter block, Modbus table	echoactive, type „PLC gives Parameters“, parameter block	----------	----------

Figure 4-18: Required Settings in the parameterization software: On the left side the job types of the serial Modbus RTU device are indicated. On the right side, the protocol of the communication partner in Ethernet is indicated

4.2 Serial Parameterization

- Select “Serial Parameterization”, and the COM port of your PC, where the connection with the echolink is made.
- The connection list appears:
- Select ***Connection > New*** to set up a new connection, the window „New connection“, appears
- Please refer to page 43 to learn how to follow up.

4.3 File (offline)

- Select File (offline) the window “Read connection file“, appears.
- Open an existing file or create a new one.
- To create a new file, enter a new name and click the button “Open“.
- The window “Select your system“, appears.
- Click the button „echolink 100“. The connection list appears.
- Select ***Connection > New,*** to set up a new connection, the window “New connection“, appears
- Please refer to page 43 to learn how to follow up.

4.4 Echoactive Function

The echoactive function is useful for stations that are, due to their communication protocol, not able to execute active jobs. Active jobs are

- Sending raw data (job type Send Direct)
- Receiving raw data (job type Receive Direct)
- Writing data (jpb type Write active)
- Fetching data (job type Fetch active)

4.4.1 Protocols and Job types

Specific communication protocols allow for specific communication services. There are protocols that enable the station to execute active jobs. Other protocols enable the station to execute only passive jobs. Others enable a combination of both.

With the procedure 3946(R) for example, sending and receiving of raw data is possible, whereas with the procedure RK512, communication can only be performed at a higher level. This means that the parameter data record, which defines the data destination (Write job) or the data source (Fetch / Read job), is also transmitted. Raw data can not be transmitted with that procedure.

With the AS511 protocol, a remote programmable controller can read a data record from a S5 PLC (The S5 executes the passive job Fetch passive). With AS511, the S5 is ready to accept data that is transferred from a remote device (The S5 executes the passive job Write passive).

But with AS511, the S5 itself cannot transfer a data record to a remote device directly (neither Write active nor Send Direct) or read a data record from the passive side directly (Fetch active). Receiving raw data is also not possible.

Protocols and possible job types WITHOUT echocative function							
Serial device with protocol:	**AS511**	**3964(R)**	**RK512**	**MPI**	**Modbus RTU**	**AB**	**IPC**
Fetch active	**NO**	**NO**	**YES**	**NO**	**NO**	**NO**	**NO**
Fetch passive	**YES**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**
Write active	**NO**	**NO**	**YES**	**NO**	**NO**	**NO**	**NO**
Write passive	**YES**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**
Send (Raw)	**NO**	**YES**	**NO**	**NO**	**NO**	**NO**	**NO**
Receive (Raw)	**NO**	**YES**	**NO**	**NO**	**NO**	**NO**	**NO**

Figure 4-19: Coherence: Protocol and job type

With the echocative functions, stations that can only execute passive jobs (due to their communication protocol) (AS511, MPI, Modbus RTU, AB, AEG, IPC), can execute active jobs.

Those jobs can be about transferring raw data (Send Direct, Receive Direct) and about transferring data with parameter data record (Fetch active, Write active).

Protocols and possible job types WITH echocative function							
Serial device with protocol:	**AS511**	**3964(R)**	**RK512**	**MPI**	**Modbus RTU**	**AB**	**IPC**
Fetch active	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Fetch passive	**YES**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**
Write active	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Write passive	**YES**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**
Send (Raw)	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Receive (Raw)	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**

Figure 4-20: Coherence: Protocol and job type

4.4.2 Echoactive Settings for Send / Receive jobs

To transfer raw data, the echoactive type “Normal“, is always used. When transferring raw data, normally a send block and a receive block must be programmed, that define the address of the information to be sent and the address for the data to be received.

With the echoactive function, the intervention in the program syntax is no longer necessary, because all required parameters are indicated in the echolink directly.

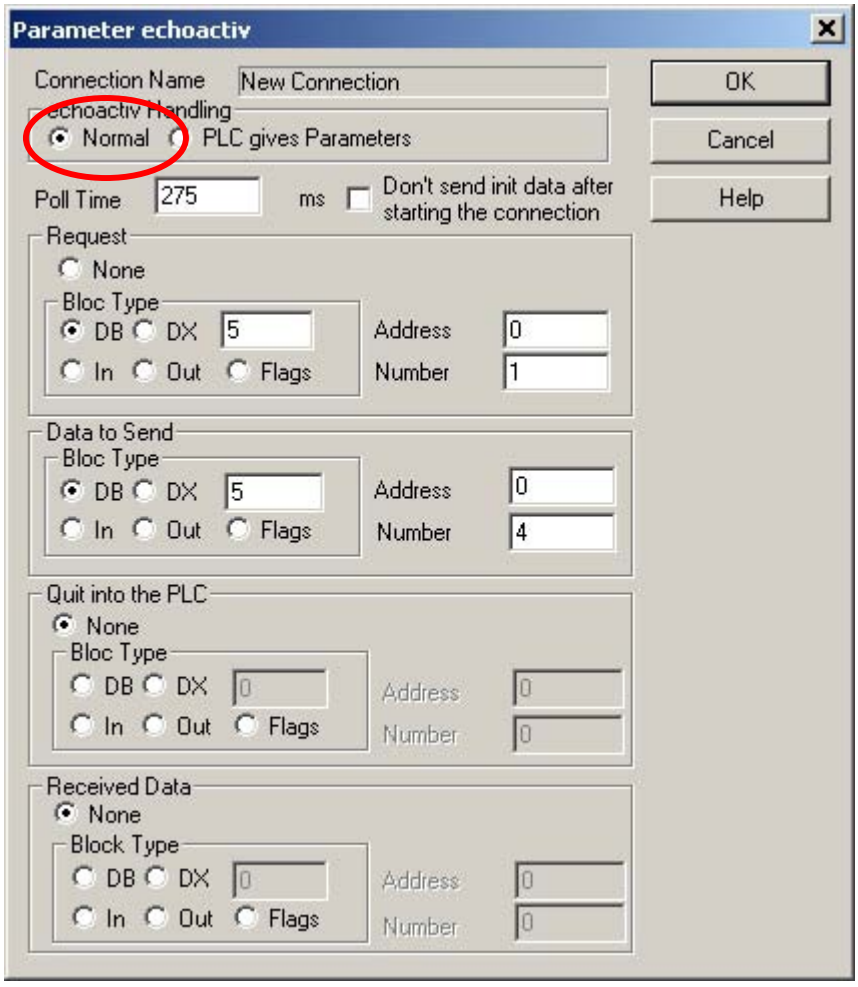


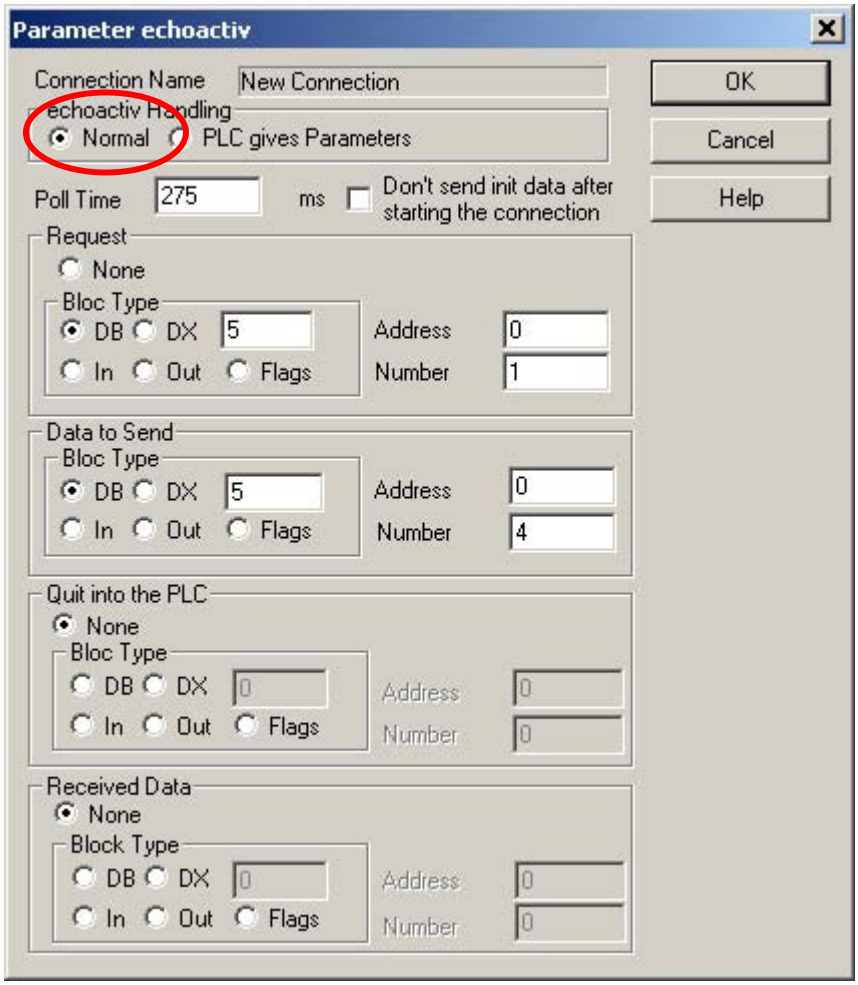
Figure 4-21: Echoactive Settings for Send / Receive job

SEND
Request
If the “request“ is fulfilled the send job is started. Echolink polls with the interval defined in the indicated range of values. In the example, echolink polls the value of data word 0 in data block 5 every 275 ms.
Data to Send
When a change occurs (Comparison New / Old), the data defined as “data to send“ is sent to the destination station.
Quit into the PLC
If a change occurred, the value of the request is acknowledged into the PLC.

RECEIVE
Received Data
The address for the data to be received is indicated here.

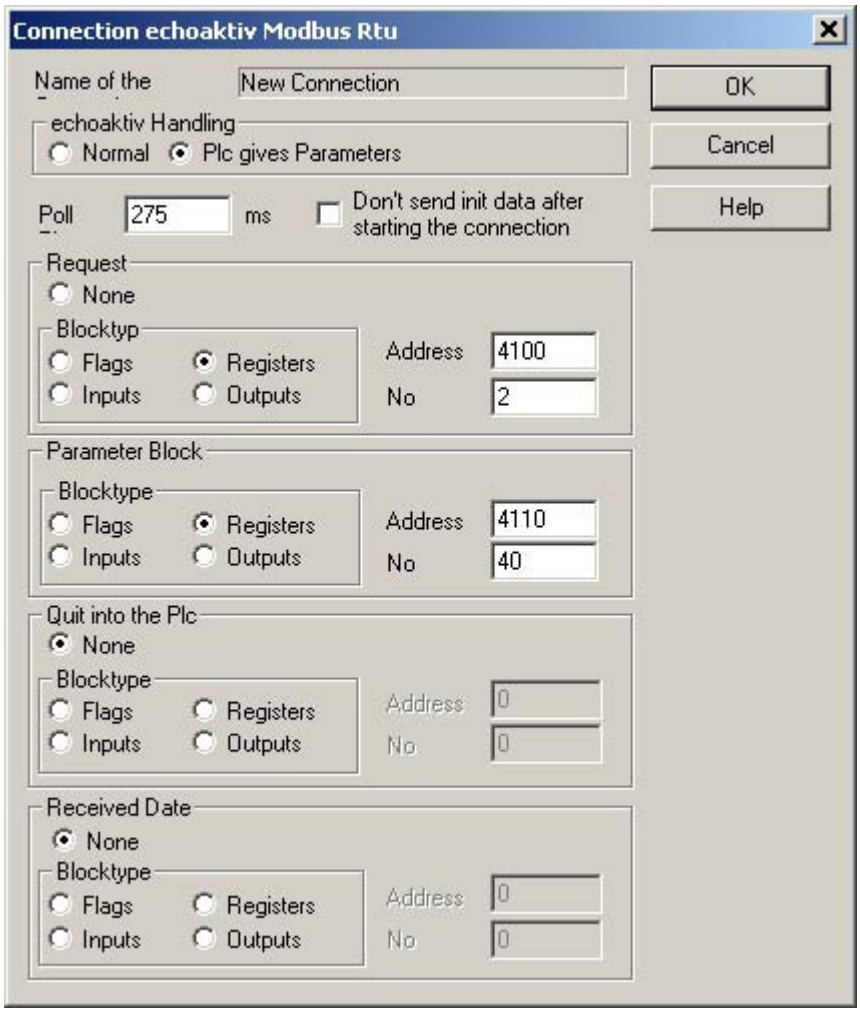
4.4.3 Echoactive Settings for Write active jobs

With a Write active job, the data source as well as the data destination is defined. If data source and data destination are the same, the echoactive type “Normal” is used.



Request
If the “request“ is fulfilled the send job is started. Echolink polls with the interval defined in the indicated range of values. In the example, echolink polls the value of data word 0 in data block 5 every 275 ms.
Data to Send
When a change occurred (Comparison New / Old), the data defined as “data to send“, is sent to the destination station. In the example the data word 0 up to data word 3 of data block 5 are sent. In the destination station, the data is received in data block 5, beginning with data word 0, length 4 Note: If the partner station is not able to interpret the data type, an assignment is required (Modbus table, AB table).
Quit into the PLC
If a change occurred, the value of the request is acknowledged into the PLC.

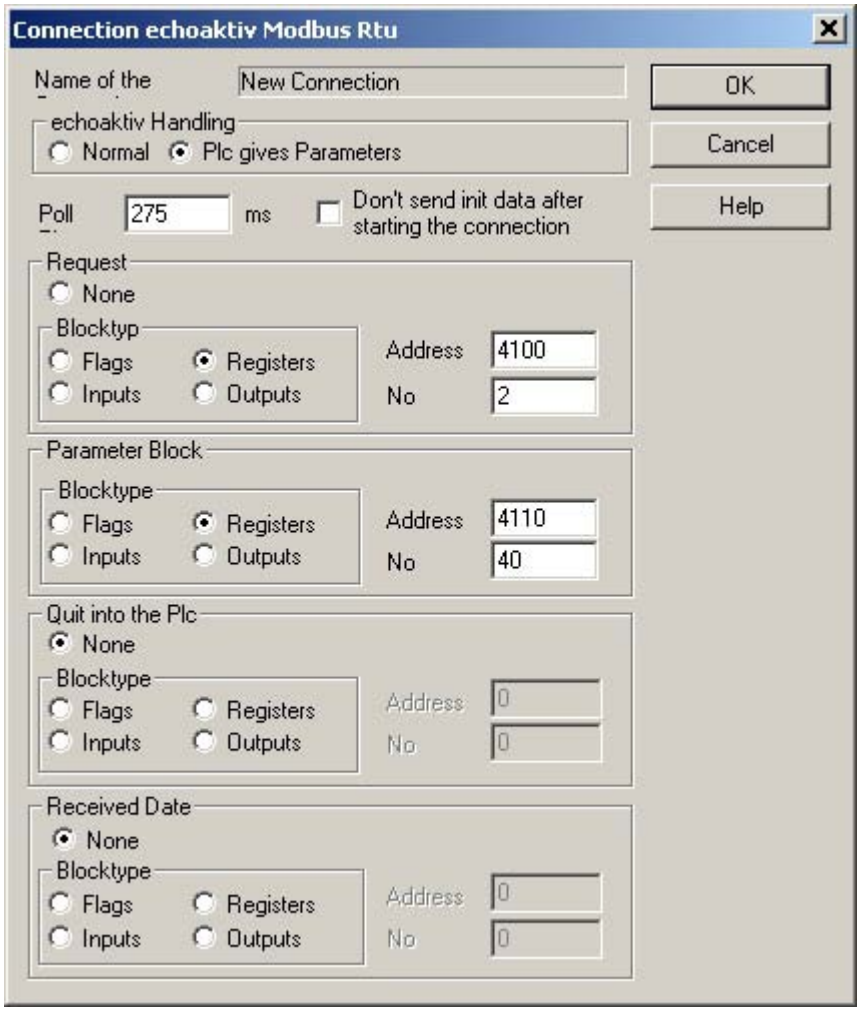
If data source and data destination are **NOT identical**, the echoactive type “PLC gives Parameters” is used.



Request
If the “request“ is fulfilled the send job is started. Echolink polls with the interval defined in the indicated range of values. In the example, echolink polls the value of registers 4100 and 4101every 275 ms.
Parameter Block
With “Parameter Block” you define the block type and the block area in the PLC, where all parameters required for the Write active job are stored. The data source and the data destination is indicated here. In the example in the register 4110 up to register 4119 the data source and the data destination is defined. When a change occurred (Comparison New / Old), the data source defined is sent to the data destination defined. Note: If the partner station is not able to interpret the data type, an assignment is required (Modbus table, AB table).
Quit into the PLC
If a change occurred, the value of the request is acknowledged into the PLC.

4.4.4 Echoactive Settings for Fetch active jobs

With a Fetch active, the echoactive type “PLC gives Parameters“, is always used. The combination “Fetch active” and echo-active type “Normal” is **NOT** possible.



Request
If the “request“ is fulfilled the send job is started. Echolink polls with the interval defined in the indicated range of values. In the example, echolink polls the value of registers 4100 and 4101 every 275 ms.
Parameter Block
With “Parameter Block” you define the block type and the block area in the PLC where all parameters required for the Fetch active job are stored. The data source and the data destination are indicated here. When a change occurred (Comparison New / Old), the data source defined is sent to the data destination defined.
Quit into the PLC
If a change occurred, the value of the request is acknowledged into the PLC. If data has been received, the requested data is stored here.

4.4.5 Settings of the defined parameter block

With a Fetch active or a Write active job (where data source and data destination are not the same), the echoactive type “PLC gives Parameters” is used. In this case a parameter block is defined, where all required parameters are indicated.

The request is as follows:

Function code		
Length	***Code***	***Meaning***
1 Byte	3	Write, Write to the PLC
	5	Fetch, Read from the PLC
SPS Element Typ		
Length	***Code***	***Meaning***
1 Byte	1	Data block (DB)
	2	Flag Flag Bytes
	3	Input Bytes
	4	Output Bytes
	5	Peripheral Bytes

	6	Counters
	7	Timer
	10	Expanded Data Blocks DX
Block number		
Length	***Code***	***Meaning***
2 Byte	0 up to 65535	Block number with DB, DX. With Modbus no meaning
Block start		
Length	***Code***	***Meaning***
2 Byte	0 bis 65535	Block start in the particular unit (8 or 16 Bit, depending on PLC and type)
Block length		
Length	***Code***	***Meaning***
2 Byte	1 bis 200	Block length in the particular unit (8 or 16 Bit, depending on PLC and type)

If data is sent (Write active), that data is listed here

The confirmation is designed as follows:

Error code		
Length	***Code***	***Meaning***
2 Byte	0	OK, no error
	1	Wrong Q/ZTYP
	2	Area not available in the automation system
	3	Area in the automation system too small
	4	QVZ error in the automation system

	5	Error in the indication word
	6	ORG Format illegal
	7	No free data buffer
	8	No free transport connections
	9	Error communication partner
	10	Connection error
	11	Message error (error in firmware)
	12	Activation error
	13	Interruption after RESET
	14	Job type with READ/WRITE
	15	Job type not available
	16	System error
Number of data		
Length	***Code***	***Meaning***
2 Byte		Length in the particular unit (8 or 16 bit, depending on PLC and type)

If data is received (Fetch active with error 0) that data is listed here.

4.5 Modbus table

The Modbus table enables the assignment of Modbus registers to data blocks and /or other data types of the automation system.

This assignment is necessary when the Modbus protocol is used on the one side of the communication (serial Modbus RTU or Ethernet Modbus on TCP) and the Modbus protocol is not supported on the other side of the communication,.

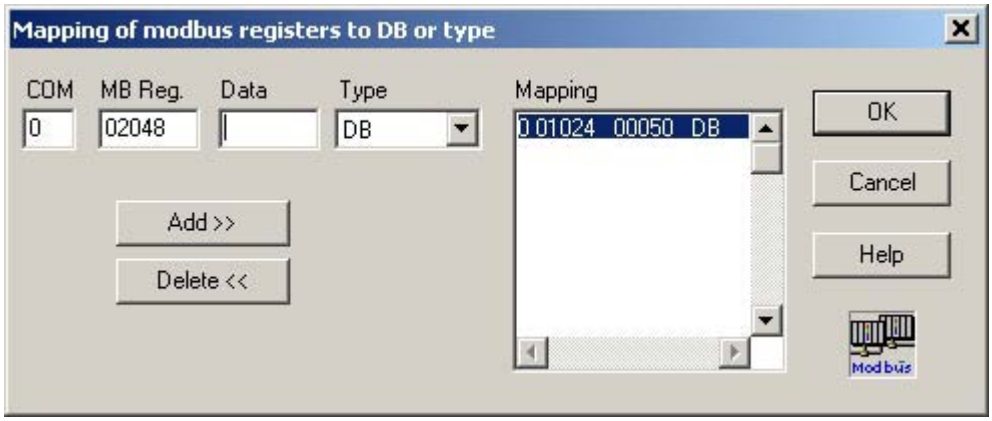


Figure 4-22: Modbus table

COM
It is possible to create several Modbus tables for specific COM ports of the echolink device.
MB Register
Enter the Modbus register here, that will be assigned a data type.
Data
Enter the number of the data types here
Type
Select the desired data type here

Click the button “Add“ and the assignment is indicated in the Modbus table

Example:

A S7 PLC will read data from a Modbus RTU slave. The S7 PLC requests DB5, beginning with DW 0, length 10. As Modbus devices do not understand the data type “data block”, because they always work with 16 bit long registers, the S7 data block must be assigned to a register. When assigning data block 5 to the register1500, echolink converts the request:

Original Request:	DB5, DW0, Len 10
Converted Request:	Register 1500, Len 5 (Registers 1500 up to Register 1504)

5 Description: Parameterization Software

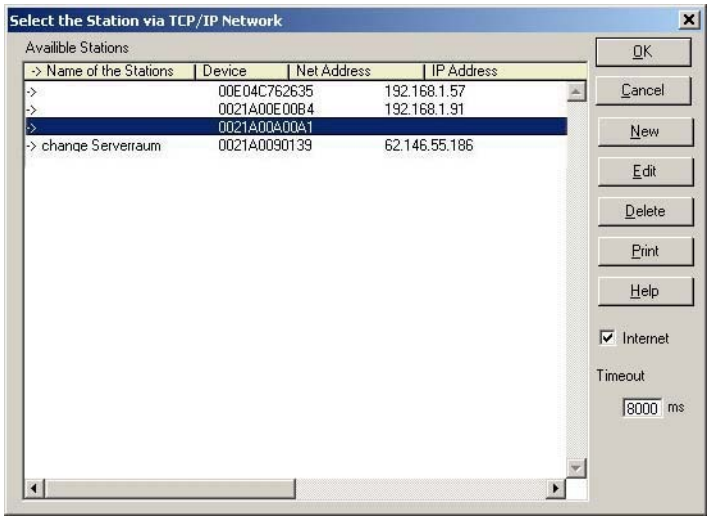
In this chapter the several dialogue windows of the parameterization software are described in detail.

5.1 Station list

In the station list all stations which are currently available online on the network are shown (Note: stations behind routers are not detected).

All stations marked with an arrow (->) at the beginning of the line are stations which are currently available online on the network. The other stations may be available but have not been recognized automatically.

In addition, the ┤ symbol indicates all computers which are running the parameterization online at the moment.



5.1.1 Station not found

If a station has not been detected in the automatic online display, possible causes are:

Interface via the network	***Serial Interface***
The selected station is turned off.	The connection cable may not be plugged in.
The protocol (i.e., H1 or TCP/IP) used for the connection is not installed correctly on your operator-control computer.	The connection cable is allocated incorrectly.
Echolink is situated behind a router.	The interface card on your PC is defective.
	The interface on your PC is being used for another task.

5.1.2 OK

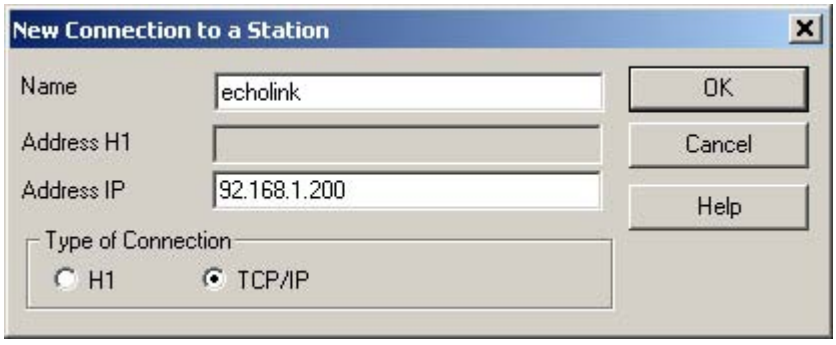
- OK indicates all available connections for this station. The established connection is monitored and after approximately 5 seconds without a response from the selected station, the connection is cancelled.

5.1.3 Cancel

- By clicking the button “Cancel“, you can leave the station list and the start dialog window appears again.

5.1.4 New

- If a station has not been detected in the automatic online display (parameterization via IP), establish a direct connection to the desired station using “New“.



- Enter the name and the IP address of the echolink station (these parameters have been defined during the registration process) and click the button “OK“. The new station is indicated in the station list. If there is an arrow in front of the station (->) the station is reachable.

5.1.5 Edit

Station parameters of stations reached via the button “New“, can be modified in this window. Station name and IP address can be changed.

5.1.6 Delete

Stations reached via the button “New“, can be deleted here. Each time you try to delete a station a confirmation window appears asking whether you really want to delete this station. Deletions are irreversible!

5.1.7 Print

A list of the stations can be printed for documentation purposes. The printout is made on the standard printer specified for the system.

5.1.8 Help

The Online help of the parameterization software appears.

5.1.9 Internet

Activate the button Internet, if stations shall be reached via Internet.

5.1.10 Timeout

The standard connection timeout can be changed here. When no data communication occurs after the time set has elapsed, the connection is considered interrupted. Since the TCP/IP usually does not use life telegrams as long-distance telegrams, the connection is also interrupted when no data has been transferred during the specified time.

5.2 Connection window

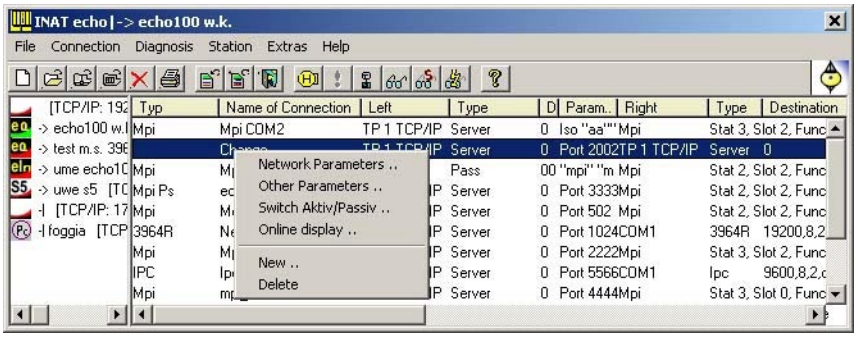
In this window you edit existing connections and set up new connections. All connections are indicated in the order of their establishment. Each connection is indicated with the following parameters:

CONNECTION PARAMETERS	
Type	Connection type Telnet, IPC, 3964R, PG, MPI, AB, RTU, AEG
Name of Connection	Name of the connection as defined while setting up the connection
Network	Transport protocol TCP/IP or H1
Type	Client or Server for active or passive connection establishment
Destination	IP address of the destination device with TCP/IP; Ethernet address of the destination devices with H1
Net Parameters	Port number and protocol (TCP or UDP) with TCP/IP; TSAPs with ISO (H1)
Serial	Used serial interface of the echolink (COM1 up to COM5)
Type	Serial protovol
Serial Parameters	Serial parameters: baud rate, parity bit et al.

- With a mouse-click or with the cursor key you can select a connection and edit it with the buttons. With a double click the window “Connection Settings“, appears
- If a connection is marked, click the right mouse button and several functions such as “Switch Active / Passive“, or “Delete“, are available.

5.2.1 Functions via right mouse button

Mark a connection and click the right mouse button, the following functions are available:



FUNCTIONS VIA RIGHT MOUSE BUTTON	
Network Parameters....	Reachable with menu Connection. Description in chapter
Other Parameters...	Reachable with menu Connection. Description in chapter
Switch Active / Passive...	A connection can be deactivated here. Connection parameters are not lost. At a later date the connection can be set active again with the same parameters.
Online display...	Reachable with menu Diagnosis. Description in chapter
New...	A new connection can be set up here. Description in chapter
Copy	A connection can be duplicated here
Delete	Deletes a marked connection.

5.2.2 Menu File

The menu file provides the following functions:

MENU FILE	
Load File to Device..	Description in chapter 5.2.2.1
Store Data to File.	Description in chapter 5.2.2.2
Print	Description in chapter 5.2.2.3
End	Description in chapter 5.2.2.4

5.2.2.1 Load File to Device

An existing parameter file can be sent to the echolink here. New parameter files can be created here.

Select the drive and the directory, where the parameter file is stored. The parameter files are shown. Mark the desired file and click the button “Open“. The parameter file will be loaded to the echolink.

5.2.2.2 Store data to file

The parameters can be stored to a parameter file here.

5.2.2.3 Print

A list of the connections can be printed for documentation purposes. The entry fields “Company name“, “Project“, and “Programmer“, should be completed so that the printout can be identified. The printout is made on the standard printer specified for the system.

5.2.2.4 End

With “End“, you leave the connection list and the start dialogue window appears again.

5.2.3 Menu Connection

The menu connection provides the following functions:

MENU CONNECTION	
Connection...	Description in chapter 5.2.3.1
Network Parameters	Description in chapter
Other Parameters	Description in chapter
New	Description in chapter
Copy...	Description in chapter
Delete	Description in chapter
Refresh Display List	Description in chapter

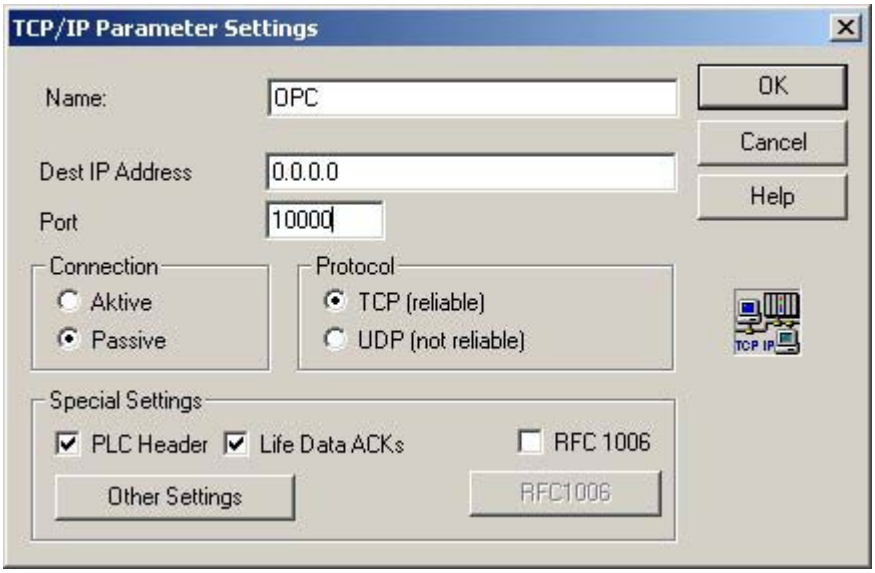
5.2.3.1 Connection...

The window “Connection Settings“, appears.

The parameters of the connection are shown in overview. With the buttons “PLC Params“ and “Net Params“ the corresponding window to edit the parameters appears.

5.2.3.2 Network Parameters

The window “TCP/IP Parameter Settings“ or “H1 Parameter Settings“ appears



The window that appears here is already known from the dialog that appears when setting up a new connection. To learn which parameters can be edited here, please see table “TCP/IP Settings“, and “H1 Settings“, on pages 45 and 47.

5.2.3.3 Other Parameters

Other parameters are only relevant if you are working with an Allen Bradley PLC. The window “Allen Bradley Protocol Settings“, appears here.

“Other Parameters“, opens the window to edit the parameters of the serial side. This window is already known from the dialog that appears when setting up a new connection.

5.2.3.4 New..

The window “New connection“, appears. For more information read chapter 4 on page 37.

5.2.3.5 Copy..

An existing connection can be copied here.

5.2.3.6 Delete

An existing connection can be deleted here. Deletions are irreversible.

5.2.3.7 Refresh Display List

This function is primarily designed for the serial link. The connection list can be read again from the echolink. For example, this would become necessary when the connection cable is plugged into another INAT echolink. The connection list is set up again with the current connections.

5.2.4 Menu Diagnosis

The menu diagnosis provides the following functions:

MENU DIAGNOSIS	
Display Connection Status	Description in chapter 5.2.4.1
Monitor all connections	Description in chapter 5.2.4.2
Network Analysis	Description in chapter 5.2.4.3

5.2.4.1 Display Connection Status

The status window is used to monitor a connection. In the headline the name of the connection is indicated. The status window is divided into a network side and a serial side.

NETWORK SIDE	
Frames sent	Number of frames sent via the network
Frames received	Number of frames received via the network
Disconnects	Number of disconnects
Status	OK, Connection break off, no connection
SERIAL SIDE	
Bytes sent	Number of bytes sent via the serial line
Bytes received	Number of bytes received via the serial line
Disconnects	Number of disconnects
Status	OK, Connection break off, no connection
Read, Sent	Number of sent and received frames
Last error	Last error; OK if there has been no error up to now.

5.2.4.2 Monitor all connections

Besides the connection name, type and connection parameters, the number of sent and received frames and the number of disconnects, is indicated for the left side and the right side. The entry L or R in the column “Slave”, indicates whether the left side or the right side is set to slave mode.

5.2.4.3 Network Analysis

The network analyzer NetSpector is opened.

5.2.5 Menu Station

The menu station provides the following functions:

MEN STATION	
Station list	Description in chapter 5.1
Current Station Adapter 1..	Description in chapter 5.2.5.2
SNMP Settings..	Description in chapter
MPI Station Parameters	Description in chapter
Original MAC Address	Description in chapter

5.2.5.1 Station List

The station list (only with online parameterization) appears. A detailed description can be found in chapter 5.1

5.2.5.2 Current Station Adapter 1....

The window to edit the station parameters for network card 1 appears (TP1).

5.2.5.3 SNMP Settings...

The SNMP services (Simple Network Management Protocol) in accordance with RFCs 1441 to 1452 offer systematic management and monitoring of a network. The following parameters can be edited:

SNMP STATION SETTINGS
Main Community
“Main Community“, is the identifier with which all services on the INAT echolink can be addressed. If no identifier is entered here, all stations can perform accesses.
Read Community
“Read Community“, is the identifier for read-only access. If no identifier is entered here, all stations are read-accessible. Write-access is not permitted with this identifier. The main community is used for this.

Accessing station
“Accessing station“, can be further restricted in addition to the identifiers. If an address other than 0 is entered here, write-access can only be performed by the station specified here. Continuation next page...
Station Getting Traps
Traps are sent to the station entered in „Station which is getting traps“. If no station is entered here (i.e., value is 0), no traps are generated. SNMP services are addressed via port 161. Traps are sent on port 162.

5.2.5.4 MPI Stations parameter

Here you edit the parameters for the MPI interface. Please refer to chapter 3.7 Setting MPI station parameters on page 34.

5.2.5.5 Original MAC Address

If you confirm with “Yes“, the hardware address of the INAT echolink is reset to the default value.

5.2.6 Menu Extras

The menu diagnosis provides the following functions:

MENU EXTRAS	
H1 system values	Description in chapter 5.2.6.1
TCP/IP system values	Description in chapter 5.2.6.2
Delete All Connections	Description in chapter 5.2.6.3
Clock Functions	Description in chapter 5.2.6.4
Modbus table	Description in chapter 5.2.6.5
MPI Ring Status	Description in chapter 5.2.6.6
Diagnosis serial	Description in chapter
Firmware update	Description in chapter
New Start	Description in chapter

5.2.6.1 H1 System Values

The H1 system parameters represent the operating parameters of layer 4. The values should only be changed in special cases.

H1 SYSTEM VALUES
Time-interval „Fast CR“
This value specifies the time interval between two Connect Request attempts (if the connection cannot be established) **before** the maximum number of CRs is exceeded and sending becomes slower.
Time-interval Slow CR“
Specifies the time interval between two Connect Request attempts (if the connection cannot be established) **after** the maximum number of CRs is exceeded and sending becomes slower.
Number of CRs at which CRs are sent slower
This value specifies the number of unsuccessful Connect Request

attempts after which the attempts are performed less frequently. This reduces the network load caused by unsuccessful attempts to establish connections. After each connection establishment and disconnection, the system attempts to re-establish the connection.
Time-interval Sending Repeats Time interval between the first and second attempt to send.
Number of Sending Repeats Attempts
The number of repeated attempts to send data with the same sequence number.
Timeout Life ACKs Time without data communication after which the connection is considered interrupted.
Time-interval Life ACKs Specifies the time after which an acknowledgment is to be sent when no data communication takes place.
Maximum Credit It is the maximum value for the credit. Credit is the number of TPDUs (Transport Data Control Unit) which may be sent without ACKs by the sending station from the destination station.
Maximum TPDU Length (code)
Maximal value of an H1
Class Options
Some of the services offered by the H1 classes 0 to 4 may be activated within the „Class Options“.
Protocol Options
By the HEX value 3 you may activate the Checksum and the Expedited Data Transfer.

With „OK“, the dialog is closed with values entered. With „Cancel“, the dialog is closed with no change of values.

5.2.6.2 TCP/IP System Values

The TCP/IP system parameters represent the operating parameters in the TCP/IP kernel. The values should only be changed in special cases. If it is necessary to change the values, please ask your system administrator.

IP SYSTEM VALUES
Time-interval „Fast CR“
This value specifies the time interval between two Connect Request attempts (if the connection cannot be established) **before** the maximum number of CRs is exceeded and sending becomes slower.
Time-interval Slow CR“
Specifies the time interval between two Connect Request attempts (if the connection cannot be established) **after** the maximum number of CRs is exceeded and sending becomes slower.
Number of CRs at which CRs are sent slower
This value specifies the number of unsuccessful Connect Request attempts after which the attempts are performed less frequently. This reduces the network load caused by unsuccessful attempts to establish connections. After each connection establishment and disconnection, the system attempts to re-establish the connection.
Time-interval Sending Repeats
Time interval between the first and second attempt to send.
Number of Sending Repeats Attempts
The number of repeated attempts to send data with the same sequence number.
Timeout Life ACKs
Specifies the time after which an acknowledgment is to be sent when no data communication takes place. This value can be zero for the TCP/IP. If so, this will disable the life telegrams. If “Activate Life Telegrams/Data Life Telegrams“, is selected, this activates the connection monitoring function which is restricted in many socket libraries. These telegrams are

used to transfer the connection status.
Time-interval Life ACKs
Specifies the time after which an acknowledgment is to be sent when no data communication takes place. This value can be zero for the TCP/IP. If so, this will disable the life telegrams. If “Activate Life Telegrams/Data Life Telegrams”, is selected, this activates the connection monitoring function which is restricted in many socket libraries. These telegrams are used to transfer the connection status.
Maximum Frame Length
Is the maximum number of bytes which are transferred in a telegram.
Timeout for ARP entries
Determines the time after which an entry in the ARP cache (Address Resolution Protocol) becomes invalid. Each access to a certain address on the cache sets the value again.
Timeout for DNS
Determines the time after which a name could not be converted into an IP address.
Timeout for Life Data ACKs
Time without data communication after which the connection is considered interrupted. Since the TCP/IP usually does not use life telegrams as long-distance telegrams, the connection is also interrupted when no data have been transferred during the specified time.
After this Time without Data an ACK is Sent
After 60 Acks the Timeout for Life Data Acks is dropped and the connection is considered interrupted.
Start Value for Next Free TCP Port [Integer]
Is used for TCP connections for which both ports are not specified. If a port is parameterized as 0, a port number is generated. The numbers which are used start at the value given here.
Start Value for Next Free UDP Port [Integer]
The same for UDP connections.

Wait factor if no PLC Header [Integer]
If the header is eliminated, the integrated connection control will also be finished therefore if you use long-distance telegrams it is recommended you increase the timeout for Life ACKs.
Wait factor if no RFC1006 Header
If the header is eliminated, the integrated connection control will also be finished therefore if you use long-distance telegrams it is recommended to increase the timeout for Life ACKs.
Allow ICMP Broadcast
ICMP (Internet Control Message Protocol) is a protocol used by the Internet Protocol Layer, to interchange control information for routing

With “OK“, the dialog is closed with the values entered. With “Cancel“, the dialog is closed with no change of values.

5.2.6.3 Delete All Connections

All connections are deleted.

5.2.6.4 Clock functions

The current time for the echolink: As long as no entries are made, the clock continues to run. Entries stop the update of the display.

Master

If master is activated, the echolink sends the time at the specified interval. The time is read by all stations on the network. The time is available to the PLC program via reserved job number 218.

5.2.6.5 Modbus table

With the Modbus table Modbus registers are assigned to data blocks or other data types. Please refer to chapter 4.5 Modbus table on page 78.

5.2.6.6 MPI Ring Status

An MPI ring diagnosis is possible here.

5.2.6.7 Diagnosis serial

This diagnosis tool is helpful when using 3964(R). The serial diagnosis helps finding errors in the 3965(R) communication.

5.2.6.8 Firmware Update

If a single file is to be updated, select ***Extras > Firmware Update***. Click the button “Open“. The file is loaded to the echolink.

You will receive complete updates via Email (.exe) from INAT GmbH. Follow these steps:

1. Start the Update Program, you received from INAT GmbH via Email (.exe).
2. DOS Program starts. You are asked to enter the IP address.
3. Enter the **IP address** of the echolink device.
4. After Update procedure echolink has to be rebooted.

5.2.6.9 Reboot

The echolink CPU is rebooted. Station parameters remain.

5.2.7 Menu Help

The menu help provides the following functions:

MENU HELP	
Content	Description in chapter
Version	Description in chapter
About	Description in chapter

5.2.7.1 Content

The contents of the online help are shown.

5.2.7.2 Version

The versions of all program modules are available in this window.

5.2.7.3 About

The window entitled “About“, provides you with the version, the release number and the manufacturer of the program.

5.2.8 Buttons of the connection window

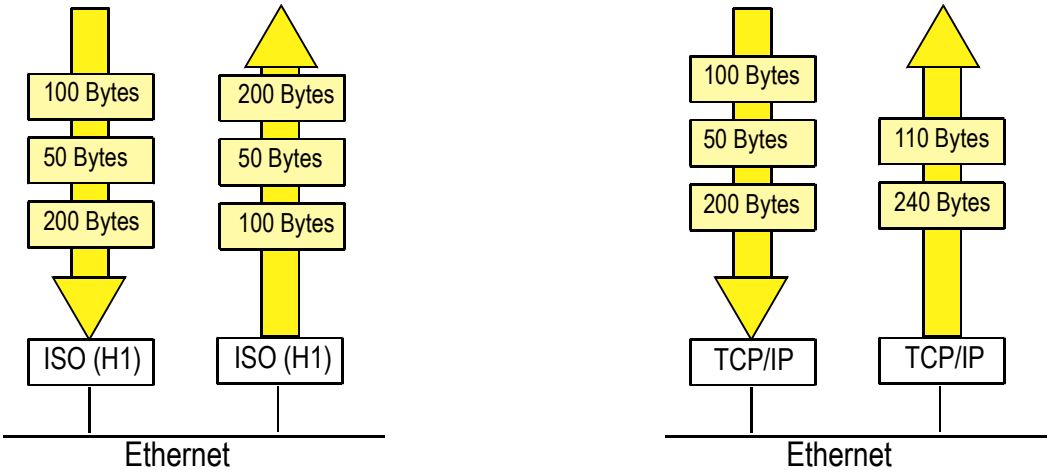
BUTTONS	
Button	***Description***
	Set up a new connection
	The window “Connection Settings“ appears
	Delete marked connection
	Print connection list
	Copy the parameters to the device
	Copy the parameters to a file
	The connection window is closed and the start dialog window is shown again.
	The window “Station Parameter Settings“ appears
	Irrelevant
	Display connection status
	Monitor all connections
	Monitor standard connections
	Diagnosis of the Fetch on Event Cache
	Online Help

6 Appendix

6.1 The INAT PLC Header

6.1.1 PLC Header General

TCP is a stream-oriented protocol. It is permitted to send almost any length IP packet it chooses. If two messages were passed to a TCP/IP stack, the TCP/IP stack may choose to put both messages in one Ethernet frame. Alternatively it may choose to place half of the first message in the first Ethernet frame and all the rest in the next Ethernet frame. There is no EOM recognition.

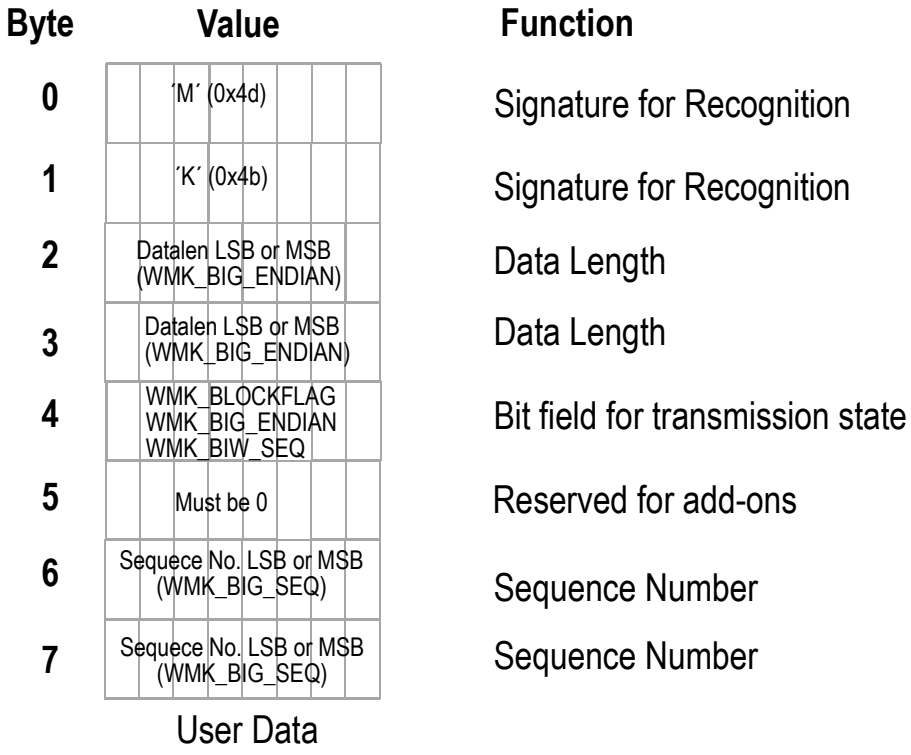


H1 (ISO) is a message-oriented protocol. There is EOM recognition. Messages arrive at the destination exactly in the same form they have been sent from the sender. Input block and Output block are identical.

For data transfer with a PLC, a block structure is required. To add this block structure to TCP, there are the following possibilities:

- PLC Header
- ISO on TCP (RFC1006)

6.1.2 Structure of the PLC Header



6.1.2.1 Field Datalen

In the field Datalen the length of the data is indicated. If DataLen is 0, a life data acknowledge (Life Data Ack) is involved and not user data. Data acknowledgement permits a form of connection monitoring where the TCP/IP actually does not provide for a remote-communication frame. Since the standard times for connection monitoring correspond to those of the H1 protocol, the S5-TCP/IP system is compatible with H1 as seen from the PLC or PC.

6.1.2.2 Bit field for transmission state

In byte 4 special bits are set to receive specific transmission states:

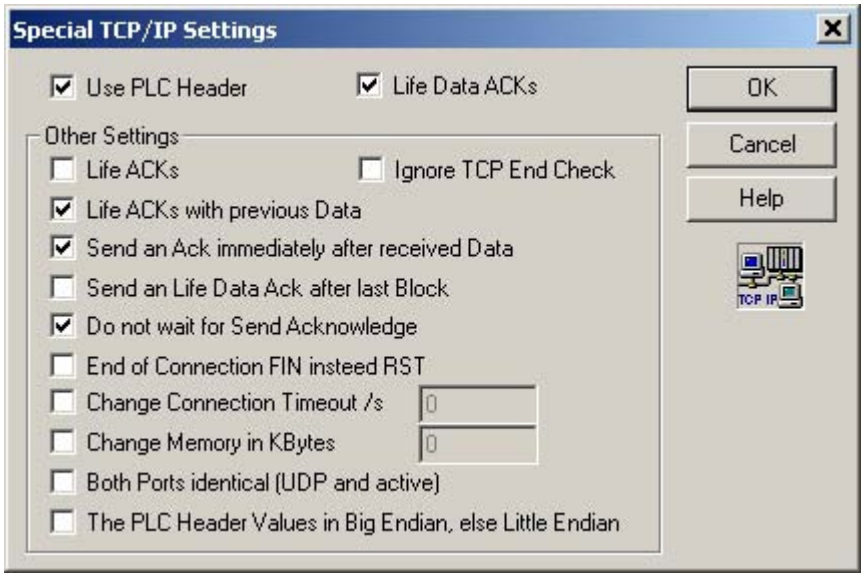
Bit Position	Symbolic Name	Usage
0	WMK_BLOCKFLAG	0: the telegram is the last one in a block sequence 1: the telegram is not the last one in a block sequence. Other telegrams are transferred.
1	WMK_BIG_ENDIAN	Data length is indicated in Big Endian Format.
2	WMK_BIG_SEQ	Sequence number is indicated in Big Endian Format.

6.1.2.3 Field Sequence number

Byte 6 and byte 7 represent a sequence number which has the value 0 when the connection is established and which is incremented by one each time user data is sent. This frame counter is used as an additional safety mechanism for the data transmission. When life data acks are sent, the sequence number is not incremented and DataLen is 0.

6.2 Special TCP/IP Settings

With the button “Other Settings“ in the TCP/IP Parameters Setting window, the dialogue “Special TCP/IP Settings“ appears.



These special parameters for working with the TCP/IP do not have to be edited in normal use. They have the following meaning:

SPECIAL TCP/IP SETTINGS
Use PLC Header
The header at the beginning of the frame can be disabled. If this is done, the application program on both sides is responsible for monitoring. Keep the following points in mind: • In the case of the Send Direct and Receive Direct jobs, certain time limits may not be exceeded for frame acceptance. If these time limits are violated, the internal buffers would be overloaded (e.g., with inquiries), and synchronization of request and response would no longer be possible. • A certain mechanism for blocked data transmission must be adhered to so that the end of the user data can be detected. • The receiving side must ensure that the frames are read from the receiving buffer before the partner station sends the next frame.
Life Data ACKs, Life ACKs

This item activates the connection monitoring function which is restricted in many socket libraries. These frames are used to transfer the connection status to process visualization. If you are using the echolink in a LAN with networked controllers, we recommend activating both functions. If the connection is being handled by a WAN, we recommend deactivating these functions to save costs. The default setting of the life acks and data life acks is”activated”.

Ignore TCP End Check

No end check is useful with Receive Direct connections only. Selecting “No end check”, disables the end check of TCP/IP frames with the reading of the data. Receive direct jobs are finished only without errors if the number of received data is equal to the number you have specified for the job in the PLC.

Life ACKs with previous data

Some IP Stacks e.g. Windows NT, only answer to Life ACKs, if there are data included. If this flag is set active INAT units send Life ACKs with 1 byte data. If the flag is not set active, life ACKs are sent without data.

Send an Ack immediately after received data

This setting is for speed. Normally TCP/IP acknowledges receipt of data after a certain waiting time (Must Ack Time).

With this setting the acknowledgement takes place at once. Background: This is useful for cyclic transmission of data in a LAN. For cyclic sending of data blocks in short intervals, this setting is useful for faster transmission.

Send a Life Data Ack after last Block

(For communications via Socket Libraries). Many socket implementations do not advise of the IP acknowledgement telegram. With this function a life data ACK is sent at once as an acknowledgement. This function is only available with communications via PLC header or RFC1006.

Do not wait for Send Acknowledgement

(For communications via Socket Libraries). Many socket implementations do not advise of the IP acknowledgement telegram. With this function, INAT units send without having received an acknowledgement. This function is only available with communications via PLC header or RFC1006.

End of Connection FIN instead RST

Some IP implementations require a “graceful shutdown“, i.e. a FIN flag instead of a RST flag. With activating this flags, connection establishment of

the INAT units is started with a FIN flag.
Change connection timeout With connection timeout the standard timeout of IP system values (30s) can be changed exclusively for this connection. This is useful for Internet connections, where Life ACKs have been deactivated.
Change memory in KBytes
The memory for this connection can be changed. The minimum memory space for a connection is 1460 bytes (Ethernet maximum of user data). For broadcast receive connection (UDP) this cannot be enough.
Both ports identical (UDP and active) The source port and the destination port are set to the port edited in the parameterization. The automation of INAT units to set the source port to a value > 1024 will then be deactivated. This setting is required for communications with CPs that do not support data transfer via UDP.
The PLC header values in Big Endian, or Little Endian
If this flag is set active, the sequence number in the PLC header is transferred in MOTOROLA Format (Big Endian). Normally (flag is not set active), the sequence number is transferred in INTEL Format (Little Endian).

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